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Bell Telephone MAGAZINE

A Statement by the Directors of the American Telephone and Telegraph Company

Finding Troubles Before They Happen • G. Robert Knell

Extending Uncle Sam's Voiceways in Alaska
Otto W. Kammerer

Design for a Good Rate Structure • Helene C. Bateman

Operating in the Hazards of Deep Snow • Stuart Shaw

American Telephone & Telegraph Company · New York

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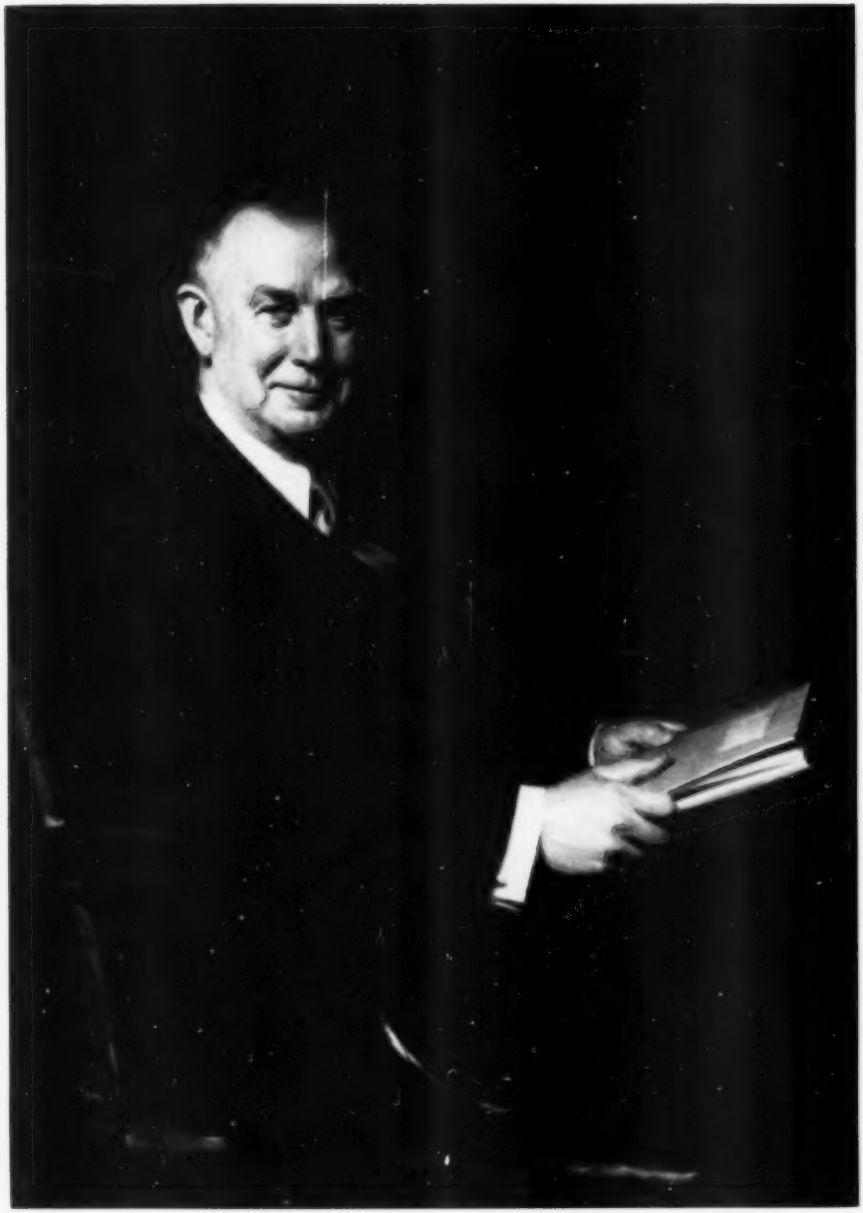
A Medium of Suggestion & A Record of Progress

JUDSON S. BRADLEY, *Editor.* *Published four times a year for the supervisory forces of the Bell System by the Public Relations Department of the* AMERICAN TELEPHONE AND TELEGRAPH CO., *195 Broadway, New York 7, N. Y.* CLEO F. CRAIG, *President;* S. WHITNEY LANDON, *Sec.;* ALEXANDER L. STOTT, *Treas.*



CLEO F. CRAIG

PRESIDENT, AMERICAN TELEPHONE AND TELEGRAPH COMPANY

A portrait by Paul Trebilcock

Who's Who & What's What

in This Issue

BETWEEN 1929 and 1943, G. ROBERT KNELL's experience in the Long Island Area of the New York Telephone Company included Commercial, Engineering, and Plant assignments which led to successive appointments as installation foreman, chief switchman, and wire chief. From 1943 to 1946 he saw service in the U. S. Navy, and in the latter year he returned to the Engineering Department of the New York Company. In 1948 he was appointed maintenance engineer for the Long Island Area; in 1950 he became district Plant superintendent for Staten Island; and the following year he was made division Plant superintendent for North Brooklyn. Early in 1952 he became a member of A. T. & T.'s Department of Operation and Engineering, where, as Plant service engineer, he works with the Plant Departments of the Associated Companies on installation and maintenance problems.

G. Robert Knell

JOINING THE Long Lines Plant Department in Chicago in 1920, OTTO W. KAMMERER had had much telephone construction experience throughout the mid-West by the time this country became involved in World War II. In May of 1942 he received a military leave of absence to join the Signal Corps, with which he served in the European Theatre. He was concerned in planning wire communications in France for the Ninth Air Force, took part in the landing on Omaha Beach, and later worked on the rehabilitation of telephone cables on the Continent. Discharged in 1945 as a lieutenant colonel, he is the holder of the Legion of Merit and four bronze stars. He was assigned temporarily to the Western Electric Company in 1950 to help engineer and construct the Alaskan project about which he writes. He returned to Long Lines in 1952, and is again on temporary assignment to Western Electric.

Otto W. Kammerer

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WINTHROP W. ALDRICH
Chairman of the Board,
The Chase National
Bank, New York

JAMES F. BELL
Chairman, Committee
on Finance and
Technological Progress
General Mills
Minneapolis

LLOYD D. BRACE
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First National Bank
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JOHN W. DAVIS
Davis Polk Wardell
Sunderland and Kiendl
New York

HAL S. DUMAS
Executive Vice President
of the Company
New York

A Statement by the Directors Of the American Telephone And Telegraph Company

Under the title of "A Message from Your Board of Directors," the following statement, with pictures of the 19 men who serve in that capacity, was sent to the more than 1,200,000 share owners of the American Telephone and Telegraph Company on January 15, 1953, with the checks for the 127th consecutive quarterly dividend. EDITOR.

AS WE BEGIN this New Year, we should like to greet all of you who share ownership of the business, and tell you how we feel about the duties you have entrusted to us.

Each of us considers that he is a trustee for the savings of every individual who has put money in the business. It is our responsibility that the Company shall prosper.

We are sure that to perform this duty, we must serve the public as well as possible. The Company is a servant of the public. The services

W. CAMERON FORBES
Partner,
J. M. Forbes & Company, Boston

G. PEABODY GARDNER
Trustee
Boston

JOHN L. McCAFFREY
President,
International Harvester Company, Chicago

ARTHUR W. PAGE
Business Consultant
New York

THOMAS I. PARKINSON
President,
The Equitable Life
Assurance Society of the
United States, New York

ELIHU ROOT, JR.
Lawyer
New York

it performs are necessary to the people of the United States. They are necessary to the building of our nation and to our national security. Clearly, we occupy a position of great public trust.

We think it all-important therefore that we furnish the best telephone service it is in our power to provide—a service high in value and steadily improving—at a cost to the user that will always be as low as possible and at the same time keep the business in good financial health.

The success of the business depends on the people in it. To serve well and prosper, the Company must attract and keep capable employees. They must be well paid and have opportunity to advance in accordance with ability. And we must continually develop first-rate leaders for the future.

Finally, it seems to us that it is always our duty to act for the long run. Sound financing, good earnings, reasonable and regular dividends—these are all long-term projects. So is our continual research to find better means for giving better service. So is the building of the human organization and character on which good service depends. So is the training of leaders. In all our undertakings, the long view is essential.

This is the way we understand the trust you have placed in us. It is a trust that deserves, and will continue to receive, the most painstaking care we can give it.

TOM K. SMITH
Chairman of the Board,
The Boatmen's National
Bank of St. Louis

MYRON C. TAYLOR
Formerly Chairman
of the Board,
United States Steel
Corporation, New York

SAMUEL A. WELLDON
Formerly Chairman
of the Board,
The First National Bank
of the City of New York

WILLIAM WHITE
President, New York
Central Railroad
Company
New York

A. LEE M. WIGGINS
Chairman of the Board,
Atlantic Coast Line
Company
Hartsville, S. C.

Preventive Maintenance Guards the Dependability of the Service While Holding the Expense of the Operation in Economic Balance

Finding Troubles Before They Happen

G. Robert Knell

MOTHER waxing the floor, Dad greasing the car, and young Jimmy visiting the dentist twice a year are all taking part in preventive maintenance programs which are considered important in our way of life. Less familiar, perhaps, is the preventive maintenance provided to insure the continued high quality of service which has become a way of life in the Bell System.

Customers usually measure the quality of their telephone service by its dependability. Twenty years ago, each of them, on the average, notified us once in every 14 months that his telephone would not work or service was unsatisfactory. Today, improvements in both equipment and preventive maintenance measures have increased that interval to once in every 24 months. Telephone folks can look with pride on that accomplishment, and it is safe to predict that in the next twenty years the interval between reports of trouble will be ever greater. However, even with the best efforts in design, construction, and maintenance, completely trouble-free service is impossible—since the elements and outside agencies often damage the plant.

Telephone maintenance work may be divided into two types, corrective and preventive.

Corrective maintenance is the actual finding and correction of trouble conditions after they have had a recognizable effect on customers' service. They are brought to our attention by customer complaints of trouble or dissatisfaction with their telephone service; by some member of the telephone family who recognized a fault or failure during his daily work; or by a variety of complex trouble alarms, indicators, or recorders.

Preventive maintenance, on the other hand, is anticipating and cor-

recting potential trouble conditions before they can affect the service of our customers. In other words, finding troubles before they happen.

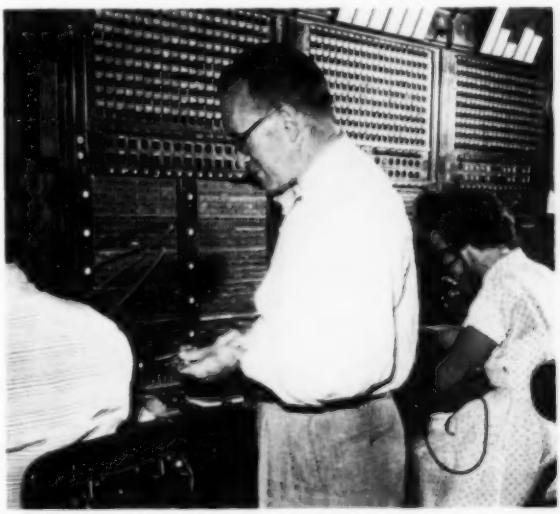
An Early Example

TO EXPLAIN the method by which preventive maintenance measures are developed, let's look back for a moment into the early days of the industry.

Many years ago, Plant people recognized that one of the major sources of interference with good customer service at manual switchboards was traceable to the switchboard cords. Constant handling of the cords by the operators and repeated bending when the plugs were inserted in the jacks caused the fabric covering to fray and then break. Having reached this weakened mechanical state, the wires in the cord would soon break. During the busy hours of the day, these inoperative cords could often seriously hinder the flow of telephone traffic.

Having detected the trouble and recognized its cause, a preventive maintenance measure was readily apparent. Frequent inspection of the switchboard cords, and replacement of those that had become frayed, effectively eliminated that interference with service. But the plant folks of the day, keeping a watchful eye on costs, soon found that too frequent inspections led to an uneconomical performance. Records of the number of times that operators reported failure of a cord in service, as well as the number of frayed cords found on inspection, were used to establish proper and economic intervals between inspections. Because of the recurring nature of such inspections, they became known as "routines," and the interval between inspections as the "routine frequency."

Determining today's requirements for preventive maintenance measures in a nation-wide telephone system is a sizable job. It becomes more impressive when we consider that this equipment enables any telephone user not only to be connected with the 45 million telephones in the United States but with 96 per cent of the 79,300,000 telephones in the world. Furthermore, 80 per cent of the Bell System's telephones are currently handled by a variety of complex dial cen-



One of the early forms of preventive maintenance: checking the cords for wear at a veteran manual switchboard

tral office equipments, and somewhat more than 40 per cent of their toll traffic is handled by mechanized equipment which permits the originating operator to complete calls by dial methods. *Amazing* is not too strong a word!

Preventive maintenance has grown in requirements and methods, progressively, as the telephone system has increased in complexity. No longer are troubles limited to the individual customer's telephone, line wire, and simple manual switchboard equipment; nor is the plant man's "look-see" sort of inspection a completely effective measure. Advances in the art of dial telephony have introduced "common" equipment, so-called because it is used by more than one line in the office. Dial senders, decoders, and markers, often referred to as the mechanical operators, fall into this category. Although used to establish a call, they automatically release upon completion of their function, to become available for other calls. Complicated test equipment, mounted on frames or "test wagons" and in portable test sets, provides means for periodic checking of the operating capabilities of such equipment, to aid in revealing any potential trouble conditions that may exist.

Built-In Preventive Maintenance

DURING this era which we might call "the telephone age," an ever-present desire to improve telephone service is apparent.

Let us look now at the development of preventive maintenance methods for dial central office equipment. "Step-by-step," the first type of dial equipment used in the Bell System, had no means for automatically recognizing trouble conditions before they affected customer service. Preventive maintenance effort consisted of inspection, lubrication, and manual testing of the dial equipment under limiting conditions.

A regular preventive-maintenance task: cleaning the alternative ringing machine

When the Panel dial system was developed, in the 'twenties, complex "common control" equipments were used. Engineers, recognizing the inadequacy of manual testing methods for this complicated equipment, devised automatic test frames. They are capable of automatically

applying mechanical and electrical tests more severe than the operating conditions encountered in customer service. When a test frame recognizes a trouble condition during a test, it gives an alarm—and a plant man can fix the trouble before it can affect customer service.

IN THE 'thirties, additional preventive maintenance aids were built in to the newer No. 1 crossbar dial system. In the older systems, when the equipment encountered a central office trouble while completing a call, the customer was stranded and eventually had to "hang up." Yet when he dialed again, usually the call was satisfactorily completed. In crossbar offices, when a central office equipment failure is encountered, the equipment automatically "recycles" itself, and attempts to complete the call by using different central office equipment. In telephone parlance, we make a second attempt, and generally complete the call for the customer without making him re-dial. In addition, under many failure conditions, a trouble indicator is connected momentarily to the equipment to identify by lighted lamps the equipment associated with the failure. Plant people are then able to analyze successive failures and pinpoint equipments which require maintenance.

In the 'forties, a trouble recorder was provided in the No. 5 crossbar system to replace the trouble indicator. This equipment provides the same feature of identification of equipment involved in a failure, but it accomplishes the recording by punching out a card rather than requiring a central office man to read the lamp indications. Thus a record can be obtained of most troubles for later analysis even though a plant man may not be available at all times.

Directing Preventive Maintenance Activity

JUST WHERE to apply preventive maintenance is found pretty generally by analyzing the records of corrective maintenance. Looking at a particular case of trouble will perhaps show how it contributes to the records which will eventually reveal the need for preventive work.

Mr. John Customer, unable to use his telephone because he doesn't get "dial tone," calls the telephone repair service bureau from a neighbor's house to report Republic 9–1234 out of order. Susan Bell, the repair service clerk, takes the details of the complaint and enters them on the "daily trouble log" and on the "line card" for Republic 9–1234. The line card then goes to Peter Deskman, who makes a test of the line. From it he concludes that the trouble must be in the central office, and so he passes the necessary details along to Sam Switchman.

Sam finds that Mr. Customer's "no dial tone" was caused by a contact trouble on the line relay associated with Republic 9–1234. After making the necessary adjustment, he advises Pete that the trouble is cleared and makes an entry in the central office trouble records to indicate that a Republic 9 line relay had to be adjusted.

Pete enters on the line card the details of the trouble found, retests the line, and advises Mr. Customer that his line is "OK now."

A manual routine testing operation on dial equipment: checking selectors in a step-by-step central office

Susan then closes out the complaint by classifying the Republic 9-1234 entry on her "daily trouble log" as a trouble found in the central office equipment. And she summarizes her logs daily and monthly to indicate how many troubles have occurred in each classification of plant.

At the end of the month, Pete's and Sam's supervisors get together to review results. From the summary of "daily trouble logs" they find that central office troubles in Republic 9 are increasing, and from the central office trouble records they discover that the larger part of the trouble involves line relay contacts. They immediately plan a preventive program to inspect and adjust the line relay contacts in the Republic 9 office.

Obviously, the maintenance team of Pete Deskman, Sam Switchman, and Joe Repairman does not find the cause for every customer's complaint of trouble. Even so, careful analysis of several such "not-found" troubles may identify equally productive points for the application of preventive maintenance measures.

DETERMINING the requirements for preventive maintenance work, as well as providing the methods and determining the interval between applications, are all initial steps in the overall program. Tools and training must be provided for the 125,000 Bell System people who at various times perform maintenance tasks. Both school instruction and day-to-day job training provide basic knowledge, but they need to be supplemented by a vast amount of information.

Bell Laboratories engineers provide detail drawings and descriptions of the operation of each new piece of equipment, as well as instructions on maintenance, adjustment, cleaning and lubrication. Bell System Plant and Engineering people in both the A. T. & T. Co. and the various Operating Companies assist in the latter work and prepare practices on the administration of the job and any specialized local situations, and Western Electric Company folks manufacture the test equipment.

With the complexity of the tele-

phone plant that we meet in our daily work, satisfactory customer service requires engineering, laboratory, and manufacturing folks to play on the same team with the repairman.

Watching the Costs

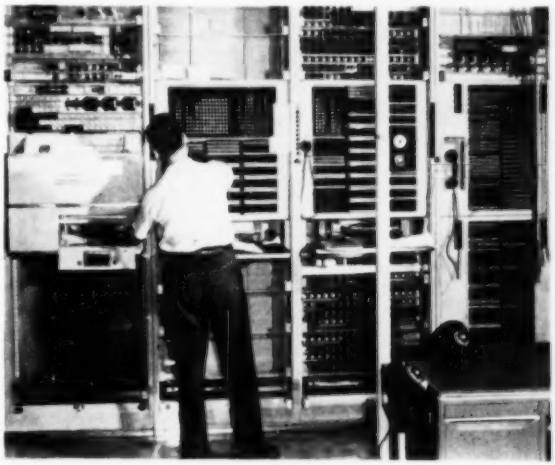
PLANT PEOPLE must keep a watchful eye on costs. Too much preventive maintenance work can force costs to a point of diminishing return which will make the entire operation uneconomical.

We might return momentarily to our original example of Dad and the family car. When it was purchased, the owner's manual recommended 300-mile and 1,000-mile inspections and servicing, followed by a continuing series of greasing, lubrication, and other miscellaneous items, all at stated intervals or mileages. Dad read the advertising at the service station, too—and bought all of the items recommended there. Undoubtedly he was pleased with the car, and it gave the family excellent trouble-free service. Dad, a cautious fellow, had followed instructions—but he sometimes grumbled when the bill came in on the first of the month.

Central office preventive maintenance routines had developed over the years until, in the late 'forties, service furnished by the equipment was good; yet looking at the maintenance bill every month raised a question as to the proper economic balance between maintenance cost and the quality of service obtained.

The situation was reviewed in 1948, and a large-scale study was started to determine what might be the proper relationship. Central office buildings of various types, in all parts of the country, were selected to participate in a long-term trial.

A committee composed of Engineering and Plant men was established in each of these offices to control the trial, protect the quality of customer service, and insure against any progressive deterioration of equipment. Then all preventive maintenance activity (except certain lubrication of power driven machinery) was temporarily suspended. As customers reported their troubles, tabular records were kept; and as indications of need developed, preventive routines were reëstablished. In addition, plant people kept a watchful eye on the equipment and, as needs became evident, suitable

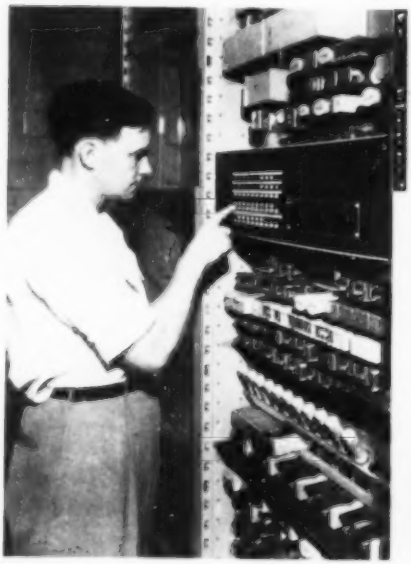


Removing a card from the trouble recorder: a more modern way of locating trouble than by laborious hand testing

routines to care for such conditions were also reestablished.

Results of the study indicated that, although some routines had not been performed often enough, many had been performed too often to pay their way. Furthermore, there was strong evidence that even in two offices of the same type, the same routines and routine frequencies were not required. That is, the application and use of preventive maintenance routines must be tailored by the Plant folks concerned to fit the needs of their own office. Aids for determining the requirements for preventive maintenance measures in any office were devised, and Plant people are now operating their offices on a "qualitative preventive maintenance" basis.

The application of the results of this study to central office maintenance programs across the country has improved customers' service. Furthermore, the qualitative approach has provided appreciable saving of effort in day-to-day preventive maintenance work. The changes from older methods of operation were accomplished without dislocation of central office people, and it is expected that further savings will accrue as qualitative methods are applied in the maintenance of other types of telephone plant.



Pushing the button automatically performs a line insulation test

An Outside Job

ALMOST EVERYONE is familiar with the sight of telephone men working on the cables, poles, and wire which are collectively called outside plant. This plant accounts for somewhat more than half of the total investment in telephone property and contributes more than a quarter of the customer troubles. Periodic inspections are an important part of the maintenance program designed to keep it in both safe and serviceable condition.

Annually, supervisors inspect the outside plant to detect trouble conditions which may develop into hazards to public safety or may affect customer service. Knowledge, thus gained, of plant conditions is used to direct the more detailed inspection and repair work of telephone people skilled in the various phases of the job. In addition, every telephone man takes pride in noticing and correcting or reporting every trouble or potential trouble condition that he sees.

On some of the long distance cable routes which are vital to country-wide communication, inspections have become standard procedure. For in-

stance, the cables connecting Boston, New York, Baltimore and Washington have all been placed underground for maximum protection. Nevertheless, a telephone man is assigned the task of riding in an automobile along the route of the cable to make sure that builders, road workers, or other construction people will not unknowingly damage the plant. In some of the more active areas, this ride is a daily affair, and in others it may occur once a week.

This outdated manual way of performing a line insulation test is being superseded by the automatic method shown on the opposite page

In the wider spaces of the West, where our cables go across country rather than along the highways, such patrols may be made from an airplane. For example, the buried cable between Shreveport, Dallas, and El Paso is one which is regularly patrolled by air to guard against unwitting damage by farmers or by pipeline, oil well, and similar construction workers.

Line Insulation Testing

ALTHOUGH inspections are effective and economical in keeping the outside plant in good condition, they cannot be completed often enough to prevent the development of serious troubles between the cycles. The largest source of such trouble is water or moisture getting inside the sheath of the cables and affecting the insulation between wires. During dry weather, breaks in the cable sheath have little or no effect on customer service, but during a rainstorm, water entering the cable may cause hundreds of troubles. The value of a means of rapidly detecting sheath breaks during dry weather was recognized many years ago, but little progress was made until the 'forties—when a new electronic line insulation test set and related techniques for its use were developed.

The success of line insulation testing as a preventive maintenance measure is attested to by its contribution to a 25 percent reduction in the number of customer reports of trouble caused by outside plant in 1952 as compared to 1947. This success is not due solely to the development of new equipment, but should be largely credited to the fine spirit which exists on the telephone team. Line insulation testing is most effectively performed in the hours just before sunrise. At this time, air in

This patrol plane is dropping a warning message, shown at right center, to a road grader working near a buried telephone cable

the cable is usually at its lowest temperature, and has contracted and drawn additional air and its contained moisture through any break in the cable sheath. This lowers insulation resistance and permits the test set to recognize a potential trouble. The record of failures encountered by the central office man who makes the test is passed along to a tester or deskman who identifies the cable involved and analyzes all indications to discern what troubles are most likely to be found. He in turn dispatches a cable repairman to locate and repair the trouble. Since all of this work must be completed before the sun has dried the moisture out of the cable, the effectiveness of the method can only be measured in terms of teamwork displayed.

A more recent development in this field is an automatic line insulation test set capable of scanning 12,000 lines per hour and recording encountered troubles on a teletypewriter in the test bureau. The set should further improve performance, and will relieve central office people of the task of making manual tests before sunrise.

Air as a Preventive Tool

THE TRUNK cables connecting and carrying the conversation between various central office buildings and cities are a vital link in communications. As such, they demand especially high-grade preventive maintenance treatment.

Some years ago, a very successful measure was developed. These cables are filled with dry nitrogen gas held at a pressure of 6 to 10 pounds, pumped up, in effect, just as we pump up a tire on our car. Pressure-sensitive switches are provided at various points along the cable run and, should a sheath break develop, the drop in gas pressure will close a switch to give an alarm at some central point, thus drawing the attention of maintenance people to the failure. In addition, the gradual escape of gas through a small break will prevent moisture from entering the cable to interfere with service, until repairs can be made.

Although this system is the best so far devised for maintaining cable plant in good condition, it is too costly for general use on the distribution cables serving customers. More recently, a trial "continuous flow gas pressure system" was installed on the distribution cables at Caldwell, New

Digging down to telephone wires, to free them from their unaccustomed burden of snow, is an unusual form of preventive maintenance

Jersey. At the central office, an air compressor and dehydrator supply dry compressed air at 6 to 9 pounds' pressure to the cables leaving the building. Before entering the cables, this air is passed through gas flow meters similar to those which measure the gas used for cooking, so that maintenance people can tell how much air is entering each cable. Although all ends of the cable have been sealed with air-tight plugs, some air is always flowing into the cables because of minute leaks, and a normal weekly consumption through the meter for each cable was established. Central office men, keeping an eye on the meters each week for excessive air flow, can readily observe when a break occurs in a cable, and can dispatch a cable repairman to fix it before service is affected. And again we have the advantage that, in most sheath breaks, escaping air will prevent moisture from entering to affect the insulation and thus protect customers' service even under bad weather conditions.

This continuous flow system of cable maintenance has been effective in aiding to provide maximum customer freedom from troubles due to sheath breaks. However, costs are still too high to make it economically attractive except under the unusual circumstances encountered in such places as the island of Nantucket, Massachusetts, where our customers are 30 miles at sea, or in Brownsville, Texas, where cable beetles drill holes in the sheath just as termites might damage a house.

Operation Snow Shovel Typifies the Future

THE ACTIVITIES so far discussed have been in the realm of the everyday problem. Sometimes preventive measures must be developed on the spur of the moment to meet an unusual situation.

During March of 1952, snowfall of unprecedented heights developed in some areas in the Sierra Nevada Mountains, where there is a cross-country long-distance open-wire line. In fact, in some places, the snow was as much as ten feet over the top of the lines. Knowing that the snow would pack tightly as it melted, and thus place strain on both poles and wire, which would eventually demolish the line, a hardy telephone team recognized an unusual condition and organized "Operation Snow Shovel." All of the snow to a level just below the wires was shoveled out to form a trench twelve to fourteen feet wide and as much as sixteen feet deep along the parts of the line that were endangered.

With nation-wide operator toll dialing an accomplished fact in many of our cities, and with Englewood, New Jersey, customers now dialing directly such points as San Francisco, the need for maintaining equipment in trouble-free condition becomes more vital daily. There is no doubt that a team which can devise the routine measures discussed in this article, and likewise tackle an "Operation Snow Shovel" on the spur of the moment, can also continue to improve service and reduce costs to meet the needs of the business.

The Bell System Helps the Alaska Communication System In Designing, Building, and Equipping a New Element in This Country's Northern Communications Frontier

Extending Uncle Sam's Voiceways in Alaska

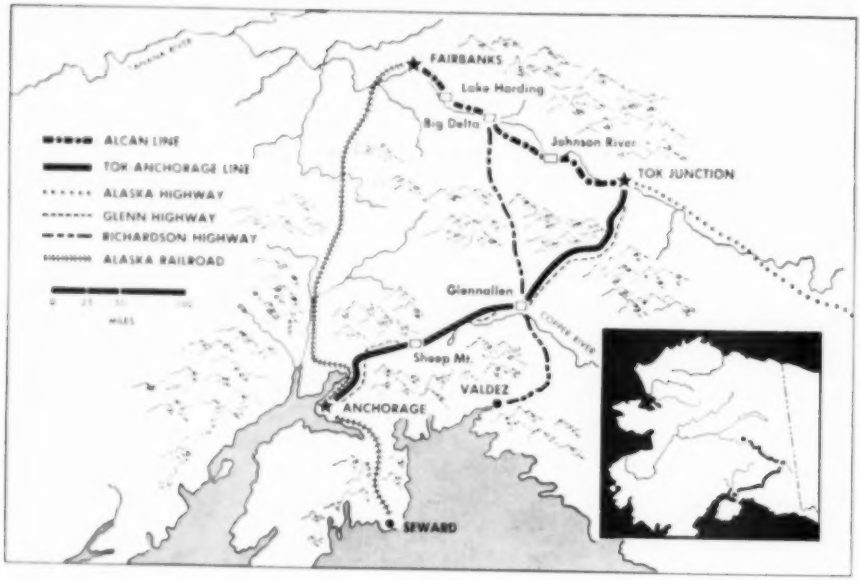
Otto W. Kammerer

AFTER more than two years of intensive work in rugged country, the Bell System turned over to the Army last October a new telephone line which becomes an important northern link in the long distance network for national defense. The new facilities substantially increase the voice and telegraph channels available for military communications between Anchorage and Fairbanks in Alaska, and serve other Territorial government and civilian uses as well.

Under an Act of Congress passed in 1900, the Alaska Communication System of the Army Signal Corps furnishes communication between Territorial military headquarters and its widely scattered outposts, and for civilian purposes too. Of late, both the building up of the Alaskan defense machinery and a tremendous increase in civilian usage have greatly overtaxed the capacity of the existing telephone circuits.

When it became clear that expanded communication facilities would be required on this American frontier, Uncle Sam—in the name of the Alaska Communication System—came to the Bell System and asked its assistance in designing, building, and equipping a new line. Various units of the telephone organization, old hands at even such special tasks as this, coöperated to create this important voiceway in the far North.

In undertaking the project, the Army contracted with the Western Electric Company to supply the necessary equipment and to construct the line. In turn, Western Electric secured the assistance of representatives of the Long Lines Department of the A. T. & T. Company experienced in surveying, engineering, and building pole lines. The Bell System men also trained Army personnel in equipment installation and maintenance of outside plant construction.



In 1949, two Bell System engineers were dispatched to Alaska to survey the situation and then select a route and determine the type of plant advisable for the number of circuits required.

The route selected was from Anchorage, on the coast, to the tiny settlement of Tok Junction, some 330 miles inland. At this point it would join the existing Alcan line * that proceeds to Fairbanks, principal city in the interior, 205 miles farther north.

The new communication line would extend through a section of Alaska not previously served by telephone. Further, as this route would generally follow the Glenn highway, the line would have a road nearby for vitally needed maintenance purposes.

Aerial and buried cable and even a radio relay system were considered as possible facilities, but, because of difficulty of construction and the high cost of maintenance, these were not recommended. It was found, surprisingly enough, that sleet and ice conditions were troublesome only in a few areas and these for the most part could be avoided. Thus, open wire, plus carrier equipment, was selected to do the job. The Army approved this recommendation, and in August 1950 a quartet of Bell System men, myself among them, set out for Alaska to get the ball rolling. It was also decided that as much outside plant work as possible would be performed by contract, with Bell System people providing the technical and inspection services to insure a standard installation.

* In 1942 and 1943 the U. S. Army had built a 2,000 mile telephone line—called the Alcan—from Edmonton, Canada, to Fairbanks, via Dawson Creek and Whitehorse.

Getting the Picture

OUR FIRST ASSIGNMENT, naturally, was to get acquainted with the country and our problem. How would weather conditions affect us and limit the working period? Were contractors available and would they take on our job? Were enough trained workmen available? What about local hauling facilities to handle our material and supplies? How were we to transport supplies from the States, and what about dock facilities in Alaska? Where would we live? These were only a few of our logistic questions.

To make matters more difficult, telephone communication with the United States was considerably overtaxed, and, as a result, calls were frequently delayed for long periods. Further, there is a five-hour difference in time between Anchorage and New York, and during Daylight Saving periods this is increased to six hours. Therefore, we either had a very short interval for transacting business or, as it turned out, someone at one end of the line lost quite a bit of sleep. Under these conditions, we soon decided that we needed teletypewriter service, which was installed.

We had to work fast, we realized, if construction work was to start the following Spring. Soon we were asking for bids and awarding contracts in order that a force might get started preparing right-of-way and carrying out field engineering. Those at home began lining up supplies, scheduling the manufacture of equipment, and attending to the thousand and one matters associated with the project. In early September, 1950, additional Bell System engineering field people arrived to help.

ALASKA LINE TIME-TABLE

1949

Preliminary survey of communication problem by Bell System for Alaska Communication System. Make recommendations.

1950

Engineering of line. Partial clearing of right-of-way. Start receiving material.

1951

Material received and distributed. Some re-engineering. Construction of line. Start buildings. Equipment installation. Training work.

1952

Final inspection of line. Finish buildings. Remaining equipment installation. Transmission line-up tests. Facilities turned over to Alaska Communication System in October.

Aerial photographs were made to assist us in selecting parts of the route and staking the line. They saved endless hours of tramping the brush and climbing mountains. Before we had these pictures, a "scout" would often beat his way up a mountain-side to what would look like a perfect location, only to find a lake, a swamp, or some other obstacle. Balloons filled with helium were also used, on occasion, to give a "fix" over heavy wooded sections or mountain tops.

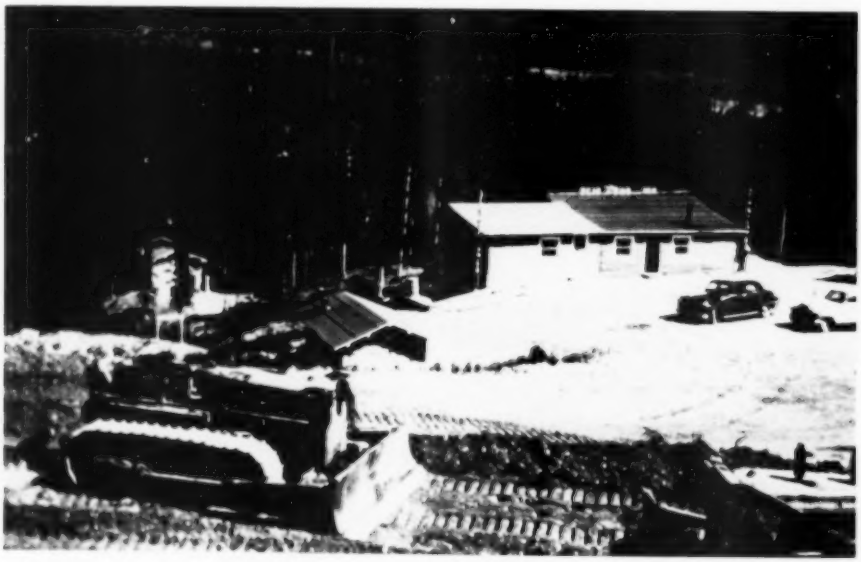
A Race Against Time

BELL SYSTEM PEOPLE selected the exact location of the line but the contractor's crew "ran" the line, measured it, drove the location stakes, and recorded all the data. On September 9, 1950, field engineering got under way when the first stake was driven,

and on the same date bulldozers started clearing right-of-way. We had 330 miles to complete before winter closed in and forced us to halt our work, and we knew we were racing against time.

To appreciate what all this meant, let me describe the northern world we had come to work in. Like many other people, I originally pictured Alaska as a huge expanse of bleak wasteland covered with ice and snow and inhabited, for the most part, by Eskimos. When we arrived, we found that we had to revise such notions, for although there was plenty of frozen tundra, there also were modern cities, fertile farmland, rushing streams, forests, and vast mountain ranges. Cities and farmland were in scattered locations, the areas in between practically uninhabited.

On this northern frontier, temperatures range from about 90 degrees above zero to a frigid 80 below. In the long winters, several feet of snow usually accumulate and the wind piles huge drifts in cuts and passes. Since Tok Junction is one of the coldest spots in Alaska, we started there and worked back toward Anchorage in the hope of winning our race against King Winter. As September advanced, the number of daylight hours dwindled and snow crept lower and lower down the mountain sides. As we came down the last mountain, some 60 miles from Anchorage, the snow followed the locating crews. During the last three or four days, these men used steel "bull" pins to make an opening in the frozen ground for the pole stakes. One crew finished its work with the snow falling so fast that it was nearly impossible to see from one range pole to the next.



A highway bulldozer and the cars of some Bell System people are halted beside Bear Cub Inn, a typical lodge along the route

Above: A contractor's trucks at a supply dump. Right: Stringing wire proceeds despite the depth of snow

Nonetheless, by October 28 we had staked the whole line and completed field engineering—a happy moment for us all!

What's more, we had also been able to provide Western Electric with preliminary estimates of the material we would require the following Spring. Only a little right-of-way clearing remained for completion in 1951.

Life Along the Route

EVERY 20 OR 30 MILES along the highway there are small frontier-style inns where the Bell System men stayed. Generally, there would be a main building (only two of them have baths) and two or three cabins where accommodations were adequate, although primitive. Once the novelty of the scenery wore off, life was pretty monotonous. However, for a number of weeks each year, gnats and mosquitoes did their best to keep things mighty active.

The high spot in the week was when we received laundry and mail from a courier service set up to de-

The repeater station at Tok Junction bears the name and insignia of the Alaska Communication System

liver supplies. We also received our pay from the courier but, curiously enough, when we were far from home, he was more eagerly awaited for news and gossip from the outside world than for that all-important envelope. That courier trip was a very rugged one—the car left Anchorage at about 5:00 A.M. on Friday and did not get back with its long list of items for purchase until late Sunday night.

Because of limited sleeping quarters and to minimize driving time, the five engineering crews were spread out over a distance of approximately 150 miles. We had the groups leap frogging into various sections as they progressed along the way, and by that method the various crews finished their jobs almost simultaneously.

The lodges along the highway could not accommodate the large number of construction people employed by the pole-line contractor, and he resorted to camps. Usually there were 70 or 75 men in a camp, which had floored tents, heated by oil stoves, that accommodated six to eight men. Modern mobile kitchens provided food. Setting up and moving these camps required the services of a special crew which was continually faced with the problem of finding sites with suitable and sufficient water for drinking and cooking.

With the exception of a little fishing, work and more of it was the order of the day. What with all the wild life in Alaska, we heard a good many bear stories, and at first everyone was a little concerned about meeting this "sport" in the brush. A contractor in New York wired us a tip that each man should wear a tin can containing small rocks which would

Long span construction makes it up the hill in one jump

incidentally, we came into contact with one feature of Alaska life which we had read about. Naturally, there is the greatest interest in the moment the ice breaks up in the Spring. Chances are sold and thousands of dollars in prize money are distributed in connection with the break-up of ice on the Tanana River. We found that a somewhat similar ice-break-up pool was held near us. Timing and recording devices are installed on a highway bridge not far from Palmer, to record when ice from

rattle as he walked, and thus scare away any lurking bears. However, after receiving this enlightening information, we read in an Anchorage paper that two prospectors, equipped with "bear scares," nonetheless found themselves surrounded by bears. Luckily, they carried a rifle and shot two bears and escaped. After that we gave up any faith in tin cans and rocks. Actually, we saw few bears, and they didn't bother us—nor we them.

While in the north,

Wire for another long span installation is pulled across Eagle River

A homesteader's lonely cabin, not far from the new communication line

Lake George has broken up and comes down the Knik River to this point. We found that this big moment occurred in July. (P.S. Not a one of us greenhorns—or "cheechakos," in Alaska lingo—won a cent.)

Shipping Supplies in Winter

NORMALLY, construction materials are not shipped to Alaska during the winter months. Consequently, when they start arriving early in the Spring, the limited dock facilities are extremely congested. We therefore decided that if we were to be assured of having our supplies on hand by the start of the construction season, the following March, we would have to send them in during the Winter months. This decision, which created problems because of the extreme temperature, meant that we had to leave a Bell System representative in Alaska during the cold months to direct the work of stock-piling.

We found that only two Alaskan seaports could be used in the winter—Seward and Valdez. The latter port, about 115 miles away from the nearest point on our line, is wedged between high mountains and glaciers and has generally foul weather and heavy snowfalls. The steamship people expressed concern whether our heavy, bulky cargoes could be speedily unloaded in winter at Valdez, and were reluctant to take on the task during this period. After many conferences, in which we explained the importance of the new facilities and our reasons for shipping the supplies at this particular time, they agreed to take on the job.

About 70 per cent of our material was shipped to the port of Valdez. It is interesting to note we set a record for discharging cargo there when we reached a maximum of 30 tons an hour. The supplies were then hauled to a temporary stock-pile on an airfield a mile away, and finally were trucked from 120 to 380 miles further inland. All this was done in bitter cold when there were only three or four hours of daylight each day and it was necessary to use gasoline lanterns for light. Car and truck engines were kept running for fear the vehicles could not be

started when they were needed and, at times, oil-burning torches were played on differential and transmission units to heat up the grease so that vital parts would function.

Shipments consigned to Seward, 120 miles from Anchorage, were unloaded from the freighters and, as there was then no road to that town and our projected line, reloaded on freight cars. The supplies were then moved over the Alaska Railroad to four sidings in the interior. Here they were sorted for final on-the-job location and hauled to these points by truck.

The new wires make an interesting pattern through the right-of-way cleared in the wilderness

Seventeen storage dumps were established, some 20 miles apart. Items requiring protection from the weather were gathered under large tents. With the ground frozen solid, it was a major undertaking even to erect such shelters. Steam had to be used to thaw out the ground sufficiently to allow tent stakes to be driven, for example.

For eight and one-half months the hauling contractor's people were on the job every day, seven days a week. Crews were stationed at dock and rail discharge points for sorting supplies and loading trucks, while other men handled the unloading of trucks at final stock-pile locations. During the winter the contractor flew his unloading crews from one dump to another in a ski plane so that the men would be there when the trucks arrived. The plane would land either at the site of the stock-pile or on a nearby trail.

Heavy Snow Creates Problems

As we anticipated that the snow would hamper unloading and storage work, arrangements were made with the Alaska Road Commission to clear new snow from the material dumps at the same time they cleared the highway. However, because of particularly heavy and frequent snowfalls and the way the constant high winds piled up snow, we found it necessary to supplement their efforts by engaging privately owned bulldozers. But it was often difficult to find anyone willing to use his equipment in the extremely cold temperatures encountered. Perhaps the only redeeming feature of the heavy snow was the smoothness and good traction it gave to the road surface.

Bell System people in New York played a big part in seeing that supplies reached Alaska on schedule. It was their task to get items from telephone warehouses and more than thirty outside suppliers, to schedule the arrival of material at embarkation ports on the Northwest coast, and to see them properly loaded aboard ship for Alaska. In the end, all the necessary supplies were on hand at the proper locations when construction was started in the Spring.

A total of about 5,000 tons of material was shipped north—12,500 poles varying from 25 to 60 feet in length; 25,000 crossarms; 700 tons of copper wires; 2,400 tons of pole line hardware; approximately 65 tons of central office equipment; and miscellaneous supplies in addition.

After the 1950 "campaign," all but one of the men returned from Alaska. At home, some went back to their regular assignments while others worked up the final job specifications, transcribed field engineering data from notes to blue prints, and let the contract for pole line construction. As can be imagined, there were many conferences by representatives of the various organizations uniting to provide the new facilities.

Another group of Bell System people returned to Alaska late in March 1951 to start actual line construction. Two members of this party decided to take their wives and drive up the Alcan Highway. There was considerable speculation about the conditions they might encounter in the rough northern country, but the women entered into the trip with zest and the spirit of the covered wagon days. Except for one tough fifty-mile stretch, the road was fine and they didn't even have a flat tire.

The 1951 Campaign

IN MID-APRIL the line construction contractor began assembling his equipment and crews—which at one time reached a maximum of 170 people—and started distributing poles and hardware and fitting up crossarms. By the end of the month, he was ready to start actual construction. The first step involved placing a two-mile length of toll entrance cable between the Federal building in Anchorage and the new Alaska Communications office near Elmendorf Air Base on the edge of the city. From that point the men began setting poles to carry the open wire lines to Tok Junction.

Construction work, like that of staking the route, had all the difficulties and special problems summed up in the word "Alaska." The Bell System men and the contractor's crew labored along winding river valleys, on the sides of sharp bluffs, in canyons, in tangled underbrush, in frozen treeless tundra, and in swamps or deep forest it was necessary to master with axes and bulldozers. The men worked within sight of glaciers and mountain ranges snow-capped even in the brief summer. The line crosses two mountain ranges, and considerable maneuvering and effort were required to get equipment over the tops of some of the ridges. Sometimes the highway made for easy access to the scene of activities, but occasionally the men were forced to follow old trails, to cross lakes, and to struggle through damp or frozen muck.

The frozen, treeless tundra offered us special problems. The upper sur-

The line strides along on a series of peninsulas reaching out into Lake Mentasta—thanks to those who rebuilt the road

face of the tundra is generally covered by moss, saturated with water, which acts as an insulating material for a permanently frozen sub-surface called "permafrost." As long as this covering is not disturbed, the permafrost remains solid. In summer, although the top of the tundra thaws, the permafrost beneath ordinarily does not. Therefore, the surface water cannot run off or be absorbed, and the ground remains a soggy marsh, often several feet deep and all but impassable.

Fast-flowing, rocky streams, ravines, and steep descents were overcome by long-span construction. Twenty-two such long-span crossings, ranging from 400 to 1800 feet, were necessary. One river, which was 2700 feet wide, required us to build three 900-foot spans in tandem. Two intermediate fixtures were set in the water on steel piling driven in permafrost to a depth of 24 feet. To prevent possible damage from ice floes, ice breakers were constructed of steel piling and driven into permafrost around each fixture leg.

Earth-boring equipment mounted on caterpillar tractors was used primarily for hole-digging and pole-setting. In most of the localities where permafrost was found, the sub-soil consists of volcanic silt which, when frozen into a solid mass, makes a high-grade abrasive. This played havoc with the earth-augers, and when permafrost was encountered it became the custom to loosen up the soil with dynamite so that the drills could perform satisfactorily. Again,

Mantanuska Glacier proclaims to the telephone men that they are in strange territory

in a 25-mile area near Sheep Mountain considerable rock was encountered and this necessitated the use of dynamite for about 700 pole and anchor holes in that area.

Highway Shifts

In laying out the line, we had felt it imperative, of course, to stay close to the highway to facilitate construction and ensure easy access for maintenance purposes. However, in 1950 the Alaska Road Commission had been in the process of straightening out many curves, making short cuts, and resurfacing, and it had not completed its survey of a large portion of the new highway. Near Lake Mentasta, some 50 miles from Tok Junction, a new route which would reduce the length of the road by approximately 13 miles was planned but only preliminary plans were then available. Consequently, although we negotiated the region by tractor and obtained data on construction problems and estimated the materials needed, we were unable to complete our engineering work at that time. In 1951, we also found that the Road Commission planned to abandon 12 miles of new highway near Tok and that the Army intended to enlarge the Elmendorf Air Base and create Fort Richardson. Both of these changes required us to re-engineer and re-locate our line in these sections.

In realigning and rerouting the existing highway near Lake Mentasta, several large swamps were encountered. As these swamps were exceedingly deep, we had no recourse except either to drive piling for pole footings or to create earth fills running into the water. We decided on the latter, and

arranged with the highway people for such construction. The peninsular fills extended approximately 30 feet from the highway shoulder and were about 10 feet across at the top. A total of 27 such fills were constructed in about a ten-mile section.

Training the Army

IT WAS DECIDED that Army personnel would install the carrier equipment under the supervision of Bell System people and in that way become familiar with the apparatus and learn something of its maintenance too. This necessitated our setting up a training school at Fairbanks. The "students" were later split into teams of Bell System men and Army installers who worked at the various repeater station installations. All trainees helped install the terminal equipment at Fairbanks, where the work was used as a sort of postgraduate course.

Thus, Uncle Sam has his new line —one carrying two crossarms with sixteen .128 copper weld wires, "point transposed" for J carrier operation. The telephone men have also lined up several carrier systems—four C systems from Anchorage to Tok Junction and one J system from Tok to Fairbanks. Repeater stations, of poured concrete construction, have been constructed at Sheep Mountain, Glennallen, Tok Junction, Johnson River, Big Delta, and Harding Lake.

Last October the Bell System turned over these additional and much-needed telephone facilities to the Alaska Communication System, and this vital link in the northern communication defense line went into service at once. To mark this occasion, an official call was made by the Commander-in-Chief of the Alaska Command in Anchorage, Lieutenant General W. E. Kepner, to Vice President F. W. Beirwirth of the Western Electric Company, in New York. Also present at the Alaska end of the line were Colonel Fred P. Andrews, the Commanding Officer of the Alaska Communication System, Colonel Otto W. Saar, the Theatre Signal Officer for the Territory, and H. N. Willets, representing the Western Electric Company.

THIS ADDITION to the far-flung communications network that the Armed Forces rely upon in protecting the nation represents more than the skill, experience, and energy necessary to the completion of any good telephone job. The men who created the new link left their homes for long periods to wrestle with harsh nature in a remote land. Theirs was a genuine sacrifice. But, to serve their country, they were glad indeed to build this new Alaska line.

Year-End Report

THE BELL TELEPHONE COMPANIES added one new telephone every four seconds during each working day of 1952, the American Telephone and Telegraph Company reported at the end of that year.

President Cleo F. Craig said "Use of the telephone continues to increase, and the Bell System Companies look ahead to another very busy year. To meet public demands and improve service further, all the Companies are keeping on with heavy construction programs.

"As our physical facilities grow," he added, "we are continually putting more new devices and equipments to work in the over-all telephone system. This is being done in accordance with long-range plans which, among other things, anticipate that ultimately telephone users will be able to dial their own long distance calls."

AT THE END of the year there were about 39,350,000 Bell System telephones in service, and people throughout the country were using them at the rate of 149 million conversations a day.

During 1952 the Company conducted a trial of customer long distance dialing in Englewood, New Jersey. Subscribers there have been able to dial directly to eleven million telephones in and around a dozen large cities from coast to coast. Results of the trial indicate the service is practical and fast.

Eight out of ten Bell System telephones were dial operated, as the year ended, and four out of ten long distance calls were being dialed by the originating operator directly to the called telephone.

New major long distance switching centers were placed in operation in Omaha, Houston, and Cincinnati. There are now 18 of these centers which, interconnected with other smaller systems, enable operators to dial through to distant telephones in 1,625 cities and towns.

About 3,100 miles of coaxial cable and radio relay routes were installed. Altogether, 16,300 route miles of these facilities provide thousands of long distance telephone circuits as well as 31,500 channel miles for the transmission of network television and theatre television programs over the nationwide system. Coaxial cable and radio relay extensions brought 14 more cities into the national television network.

THE COMPANIES went forward with new construction for which expenditures totaled approximately one and a quarter billion dollars. They added more than 1,900,000 telephones, installed 2,000,000 miles of long distance circuits, and cleared 850,000 requests for changes in service to a line with fewer customers or to an individual line. In rural areas, about a quarter of a million telephones were added, about half of them on lines with more than four parties, and progress continued in furnishing the

kind of service where it is only necessary to lift the receiver to get the operator or dial tone. At the year's end, about 94 per cent of rural telephones were this type.

Among the many technical developments of the year was a new coaxial cable system with triple the capacity of those now in use. Designed by the Bell Telephone Laboratories, the "L–3" carrier will enable one pair of coaxial pipes to handle simultaneously more than 1,800 telephone conversations or 600 telephone conversations plus one television program in each direction.

Another Laboratories' invention, the transistor, was put to work during 1952 in the switching apparatus at Englewood. The transistor is a tiny electronic device which can do many of the things vacuum tubes can do and some things better. Licenses to manufacture transistors under Bell System patents were made available to 37 other companies by agreement with the Western Electric Company, whose own output has been mostly for military use.

MR. CRAIG emphasized that "The telephone needs of the military and of defense industry will continue to get the promptest possible attention. The people of the Bell System," he said, "are deeply conscious that nothing is so important as the country's defense, and nothing is more important to defense than good communications."

Plans were completed for the maintenance of essential telephone service in the event of emergency. Aircraft warning systems were set up for Civil Defense and Air Force filter centers. The Bell Telephone Laboratories and the Western Electric Company designed and produced top secret electronic devices as well as guided missiles, fire control equipment for anti-aircraft guns, radar, atomic weapons, and a new field telephone for the Signal Corps. Assistance was also given the Signal Corps in the construction of vital long distance communications linking strategic areas in Alaska. For the millions of young Americans in uniform, more telephone facilities were made available in convenient, comfortable locations at their training camps and stations.

The number of Bell System employees, including the Laboratories and Western Electric, reached nearly 700,000. And not only were more people than ever employed in the business, there were more people than ever owning it. A. T. & T. shareowners passed 1,200,000, a gain of about 125,000 for the year.

"The tremendous rises in costs since the war are keeping the telephone companies under the necessity of obtaining increases in rates," Mr. Craig concluded. "This is essential to their being able to provide the kind and amount of service people need and want in the communities where they operate."

The Rate Engineers Seek to Implement the Objective of "The Most Telephone Service and the Best at the Least Cost Consistent with Financial Safety"

Design for a Good Rate Schedule

Helene C. Bateman

WHAT is a good schedule of telephone rates designed to accomplish?

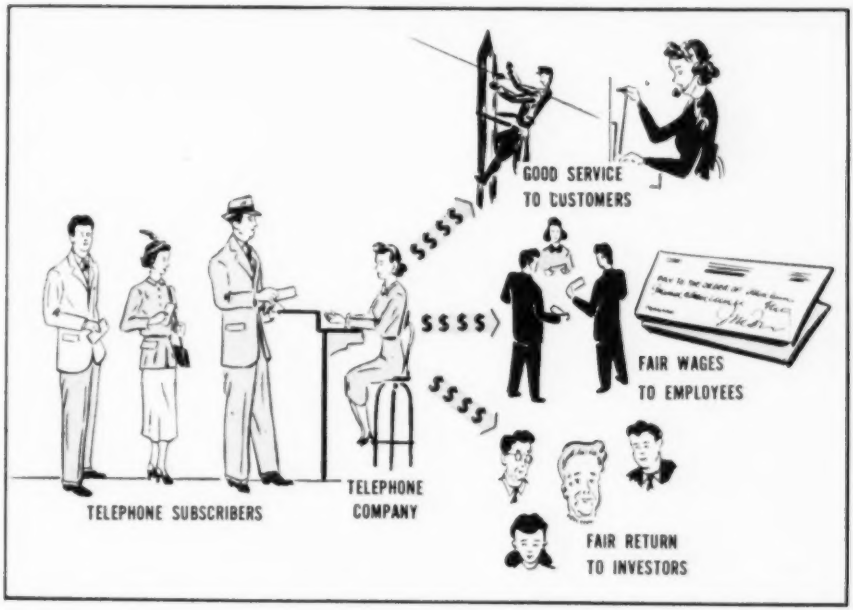
"Elementary," you say: "telephone rates are designed to bring in enough money to run the business; enough so that the company can furnish good service, pay fair wages, and earn a fair profit."

Very true, and most important. But a well designed schedule of telephone rates can and does accomplish many other things in addition to producing a given amount of money.

Unlike most other businesses, the telephone company is a public utility, with earnings limited by regulatory authority. Various rate schedules can be designed which will produce the allowed return, and the telephone company's greatest interest is to choose from among them the one which will best serve the public.

Such a schedule obtains the necessary revenues with the lowest practicable rates and in ways which will keep revenues as stable as possible, thus minimizing the need for future rate increases. It encourages more people to have telephones and to use them more. It meets the needs of groups of customers whose requirements are different from the average. It promotes a high quality of telephone service and at the same time helps to keep down the costs of furnishing it. And the distribution of charges among customers is fair and reasonable.

The first step in designing a schedule to accomplish all this is to set up the different classifications of telephone service. Unlike a department store, which sells a variety of articles as obviously different as pins and pianos, the telephone company has basically just one thing to offer: the means by which people beyond shouting distance can talk with one another. For pricing purposes, this one basic service has to be classified as



Adequate rates are the only source of money to give—
good service to customers
fair wages to employees
fair return to investors

local or toll, business or residence, individual or party line, and so on.

The next step is to determine the type of rate to apply to each class; for example, whether a fixed monthly charge or a charge per message; if a message charge applies, whether it will vary with distance, length of conversation, or other factors.

Finally, the specific rate for each service item is determined, not in isolation but as an integral part of the entire rate schedule.

This is essential because no one talks to himself by telephone. Consequently, each customer's service depends on the service furnished to others. Rate treatment influences the amounts and types of telephone service customers take and the calls they make. So each rate in the schedule affects not only the customer who pays it but also every one who may want to talk with him.

Thus, through selection of the most suitable classes of service, types of rate treatment, and relative rates for the different classes, a rate schedule is designed which will best do its part in promoting the Bell System objective of "the most telephone service and the best at the least cost to the public consistent with financial safety."

To make this more concrete, let's join Jim Brown while he takes a look at his home telephone bill.

There has just been a big change in telephone service for Belleville, the small town where the Browns live. They now get local service to Fairview, the city where Jim works, and two small towns nearby. The telephone company calls it "extended area" service, but Jim and most of his friends talk about "toll free" service, because they won't have to pay the 10-cent toll to call Fairview, Springdale, or Brookside any more. Of course their monthly exchange rates will be higher. So Jim is looking over this first month's telephone bill more carefully than usual, to see how he is coming out over all.

Jim is pleased to see that his total bill is about the same as formerly—a little more than some months, a little less than others—although the family has been using the telephone a whale of a lot more. The monthly local service charge is up $1.50, but those frequent calls to his mother, who lives alone in Fairview, don't show up as tolls any more, nor the ones from Nancy calling him at the office to remind him what not to forget to bring home. Jim notices, too, that his calls to Bill Smith in Akron cost quite a bit less since he got Bill's number and places the calls station-to-station. The rest of the bill is about as usual.

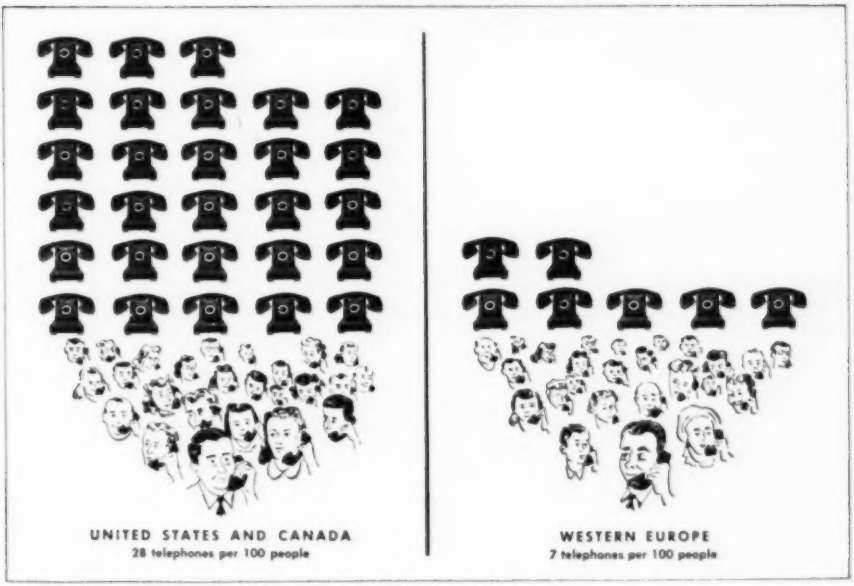
Does Jim Brown wonder why the rates for his main and extension telephones and for the toll calls he makes were fixed just the way they are? Or why they are different from the charges his boss pays for business service in Fairview? Probably not. Jim sees that his bill seems reasonable, and it's a very small part of the family budget, so he lets it go at that. Actually, Jim Brown's telephone bill is the end result of much time and thought by the telephone company's rate engineers to make sure that the new rate schedule will best accomplish all the objectives of good rate making. Let's review these objectives one by one, and see how this is done.

Adequate and Stable Revenues

JIM BROWN'S BILL is higher now than it was before the war because with inflation his telephone company's costs of doing business have gone up and higher rates are necessary to produce adequate revenues.

It is not within the scope of this paper to discuss either the necessity for adequate revenues or the means of determining the amounts required. It must be emphasized, however, that the telephone company has no passkey to Fort Knox. It has no means of obtaining revenues except through the charges paid by customers, and its dollars, like everyone else's, are worth only half what they used to be. So the rate engineers must be sure, first of all, that the new rates applied to the telephones in service and the chargeable local and toll messages will, in fact, produce the required amount of money—neither more nor less—as nearly as can be estimated.

The rate engineers also know that revenues from some types of services are more stable than from others. Toll traffic, for example, is greatly stimulated by such occurrences as the war in Korea and the consequent defense activities. Consequently, toll traffic and toll revenues may be expected to level off when these activ-



America has the highest telephone development in the world. A promotional rate structure is a big factor in this achievement

ities are curtailed. Revenues derived from monthly exchange rates, on the other hand, are less likely to be seriously affected. Incidentally, the probable stability of future revenues was one consideration, though a minor one, which favored eliminating the toll charge between Fairview and Belleville and substituting extended-area service covered by the monthly exchange rate.

The objective of adequate and stable revenues for the company does not conflict with other objectives which mean more and better service to customers. In fact, they are opposite faces of the same coin. If the company does not obtain adequate revenues, it cannot furnish satisfactory service. If customers are not satisfied, the company cannot grow and keep financially healthy. So, let's see how telephone rates do some of the other jobs assigned them.

More Telephones

ALMOST ANY BUSINESS likes to attract as many customers as possible, but it is only in the telephone field that the added customers increase the value of the product.

The Browns' refrigerator and washing machine do their work regardless of whether the neighbors have these conveniences or not. Mrs. Brown gets an extra kick out of her new fur jacket just because none of her friends has one like it. But, if the Browns' telephone were the only one in town, it would be of no use to them at all. It is more useful and worth more to them now than

Rates are designed to encourage everyone to use the telephone. "Nothing is more hopeful for the future of our business than the intense interest and desire of young people to use the telephone"

it was a few years ago, because the baby sitter, the handyman, and lots of other people they want to call have had telephones put in recently. So rates which attract more and more new telephone subscribers benefit not only them but also all other telephone users.

What are the rate treatments especially designed to do this? One is the classification of telephone service between business and residence. The telephone is of great value to business concerns, large and small. It brings in customers and saves time and money far in excess of telephone charges. So almost any business man would think it very poor economy to try to get along without a telephone. On the other hand, some moderate-income families might not feel able to afford telephone service if residence rates were the same as those charged business establishments. So basic residence rates are made lower than business, in order to build up a large residence development. This, in turn, benefits the business customer and is the reason why the Browns' home telephone costs less per day than does a pack of cigarettes.

Another way of attracting low-income families to join the telephone system is by offering party-line service. In Belleville, four-party residence service can be had for $1.75 a month less than the Browns' individual line. It may be this very low rate which encourages the Browns' baby sitter and handyman to have home telephones.

These types of rate treatment, designed to encourage residence development, have been common for many years in this country. In many European countries, by contrast, business and residence rates are the same, and party-line service is rarely furnished. This may account, at least in part, for the fact that so many more of the homes in this country have telephone service.

Promotional rates are available to business as well as residence customers. In Belleville, for example, most business customers have flat-rate individual-line service, entitling them to an unlimited number of local calls. In addition, to make sure that every business man has a high-quality telephone service within his reach, the telephone company also offers a business message-rate service at a low monthly rate for a limited number of local messages, with an added charge for each additional message. Even the smallest business can afford this service.

More Telephone Calls

BELL SYSTEM rate schedules are designed to encourage people not only to have telephones but to use them; to make telephoning an essential part of their everyday way of living and doing business.

Even the seemingly useless calls—Johnny chatting with the girl friend, Betty and Joan giggling over their homework, little Susan babbling to grandma—are important to the people involved. The more that people use their telephones, the more satisfaction they get from them and the more anxious they are always to have a telephone.

"Flat rates," which permit customers to make as many local calls as they wish at a fixed monthly charge, are the most effective means of encouraging customers to make the greatest use of their telephones.

Rate schedules are designed to make it easy for customers to step up from party line to individual line as their requirements increase

They are particularly effective in the case of residence service. Experience indicates that residence customers with flat-rate service make about twice as many local calls as those who have message-rate service.

Customers like flat-rate service and are willing to pay the higher rates required because they enjoy freedom of use and get so much service. Take the Brown family, for instance. Jim Brown likes their flat-rate service because he knows in advance just what his monthly local charge will be and he doesn't have to check up on the youngsters to keep them from running up his bill. Mother certainly appreciates it when she has to call a long list of club members. Johnny and Betty are sure their social lives would be wrecked without free access to the telephone. Even five-year-old Susan rounds up the neighboring cow-girls by telephone.

This is all to the good as far as the telephone company is concerned. Nothing is more hopeful for the future of our business than the intense interest and desire of young people to use the telephone.

Extended-area service is another type of rate treatment designed to encourage greater use of the telephone. Where there is a good deal of community of interest between towns, customers are glad to pay a somewhat higher monthly charge for the wider calling privilege. With the new extended service, Jim Brown will call his mother every evening from now on. Betty hopes several boys in the other towns are going to call her for dates. Mrs. Brown will do more of her out-of-town shopping by telephone. Even if the extended-service charge is a bit higher than their former local rate plus former toll charges, no one minds, because they will all get so much more for their money.

Special Services and Facilities

SOME CUSTOMERS have needs for special services or for facilities different from those of the average telephone user. The telephone companies try to meet such special needs as far as is practicable without burdening the great majority of customers by hav-

ing them pay for costs incurred for the benefit of a few.

Grandma Brown is quite deaf, and her telephone is equipped with an amplifying device. The flat monthly charge for this special set is kept very low, not only for the benefit of those with hearing defects but also in the interests of all other customers who may wish to talk with them.

On the other hand, the X.Y. Co., the large manufacturing concern for which Jim Brown works, has a rather elaborate intercommunicating network specially designed for its plant. The charges for this recognize the various service features, and their levels are commensurate with the high value of these special arrangements to the X.Y. Co., since they add little to the service of anyone else.

High-Quality Service

Good telephone service depends primarily, of course, on the operators, maintenance men, service representatives, and others who day by day work together to furnish it. Yet a well designed rate schedule can also help ensure a high quality of service by offering only those classes of service which have proved generally satisfactory and by influencing the amounts and types of service which customers use. For example, the differentials between individual-line and party-line rates are fixed at levels which, in normal times when facilities are available, encourage customers to proceed naturally from party to individual lines as their needs increase.

When the Browns were first married, they were on a party line. As the family grew and their telephone use increased, they found it cost only a little more to change to individual-line service. If the rate difference had been too great, the Brown family might have stayed on the party line; and as their use increased, a generally unsatisfactory service situation might have developed.

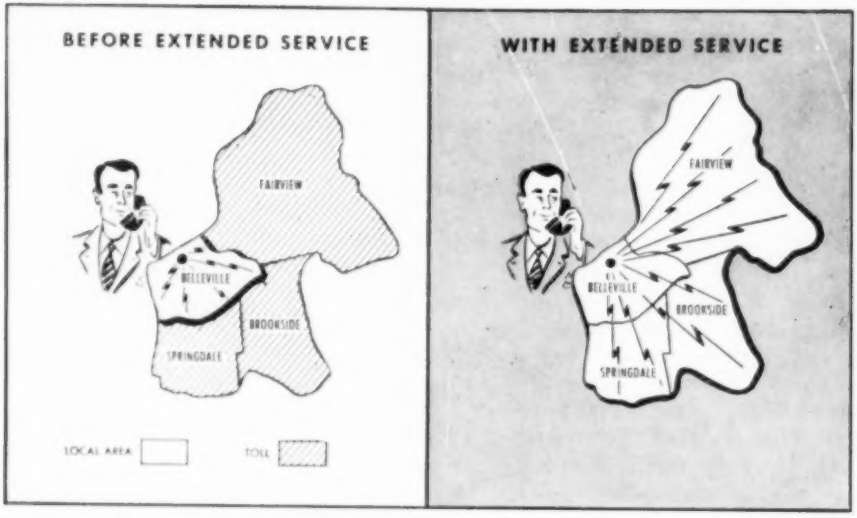
Unfortunately, in the present period of shortages, it is not always possible to give all customers the type of service they need and desire. However, rate schedules are designed so that rate differentials will present no obstacle to customers taking better grades of service as soon as facilities are available.

Contrast between American toll rate schedules and those in effect abroad furnishes another illustration of the relation of rate treatment to quality of service. Most foreign toll schedules provide for "express" and "lightning" calls at progressively higher premiums over the rates for "ordinary" service. The American toll system, in effect, provides "lightning" service on all calls and no rate premium is charged.

Keeping Costs Down

Neither the telephone company nor its customers want to sacrifice good service in an effort to cut costs. But rates can help avoid unnecessary costs.

For instance, some time ago Jim Brown made a call to Bill Smith in Akron without knowing where Bill was staying. Several operators did a lot of work and used expensive long distance circuits and switchboard facilities before Bill was finally located. The next time, Jim got Bill's telephone number from Bill's secretary



Extended service gives the customer many more calls at a lower cost per call to both company and customer

and placed the call station-to-station. The call went through much quicker, Jim saved money, and the telephone company saved a lot of operators' work and circuit time. Now Jim clearly sees why the station-to-station rate is made substantially lower than the person-to-person rate, in order to encourage customers to place their calls on a station basis whenever possible.

Sometimes a type of rate treatment reduces unit costs by making more service available at about the same total cost. The extended service between Belleville and adjacent towns is a case in point. The Company saves operating, accounting, and other work because calls to these points can now be dialed by customers and it is no longer necessary to ticket and time the calls, compute and bill charges, and so on. On the other hand, with extended service, customers make a lot more calls, and the company has to provide the circuits and other facilities to carry the additional traffic. These added costs may amount to somewhat more or somewhat less than the savings, but, in either case, customers get much more service (sometimes five or six times as much) and the cost per call is 'way down.

Fair Distribution of Charges

TELEPHONE RATES are applied in accordance with established tariffs which clearly set forth the classes of service offered, the rates for each class, and the administrative regulations. This ensures fairness through the uniform application of the schedule to all customers.

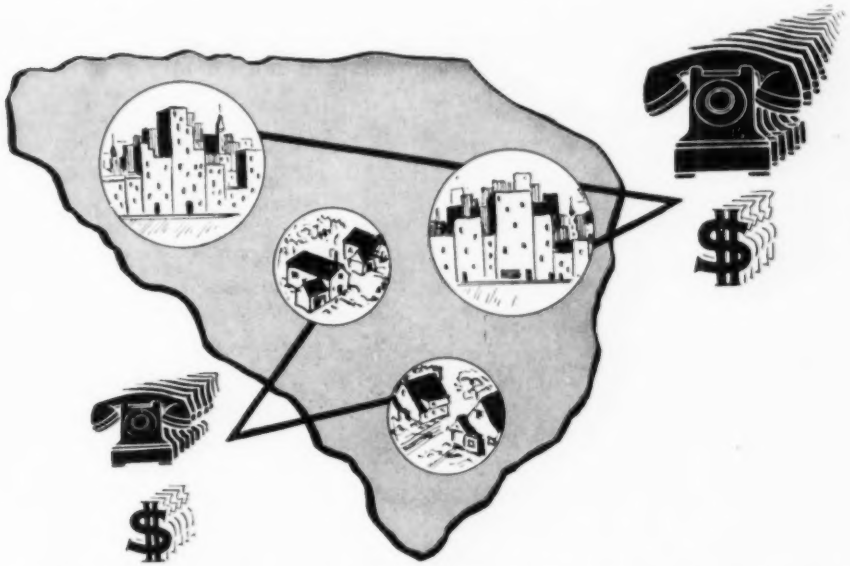
Fairness also requires that important differences in service be recognized by differences in rates. Party-line customers pay less than do individual-line customers, obviously,

because they share the use of their line. Business customers pay more than residence because telephone service is more valuable to them and, as a group, they use it considerably more. Toll charges increase with length of haul and length of conversation.

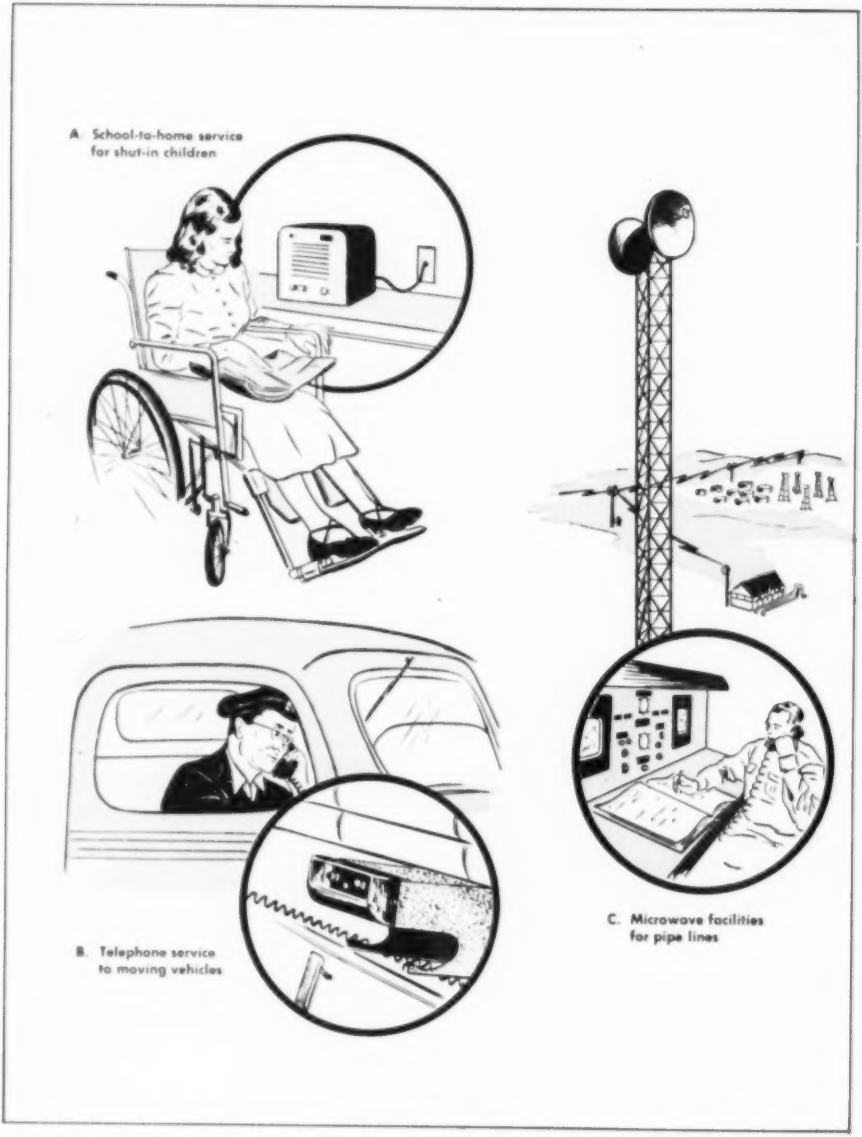
On the other hand, attempts to recognize too many minor differences would result in rate schedules so complicated that customers would not understand them and the company would find them difficult to administer. Any workable rate schedule requires grouping of customers and a certain amount of averaging out of charges. Equity requires that these groupings be reasonable, based on type, amount, and scope of service, and that customers who receive the same or closely similar services under like conditions pay the same charges.

An illustration of this is the gradation of exchange rates in accordance with number of telephones available. With their new extended-area service, the Browns can reach 40,000 telephones without a toll charge. The telephone company makes the same charge to every other family in the state which has the same class of service as the Browns and, like the Browns, lives in the built-up portion of an exchange with about 40,000 telephones available at local rates. Similarly, in the toll rate schedule within the state, the same rate applies for calls between points the same distance apart. Obviously, these are fair methods of charging.

IT MAY BE well to mention here that a fair distribution of charges does not require that each individual or each group of customers pay charges based on estimated costs of serving them.



Within a state, telephone users pay like rates for comparable kinds and amounts of service


A. School-to-home service for shut-in children
B. Telephone service to moving vehicles
C. Microwave facilities for pipe lines

Telephone companies offer facilities and services at appropriate rates to meet the needs of customers who have special requirements

The great bulk of the telephone company's costs for basic services are incurred in order to make it possible to connect any one telephone with any other, and in making these connections, on demand. Such costs are common to everyone and to try to separate them is like trying to unscramble eggs.

Furthermore, attempts to base rates entirely on estimated costs would more often than not react greatly to the customers' disadvantage. Take Joe's market, where the Browns buy most of their food, usually ordering by telephone. Someone might figure that it doesn't cost much to serve Joe, because the market is right next to the central office and Joe doesn't make many outgoing calls. The Browns live in the newer part of town and their youngsters make lots of calls. So the costs of serving the Browns and many of their neighbors might seem rather high. If rates were based on these estimates of costs, Joe's telephone bill might go down several dollars a month, it is true, but he would hardly notice the difference in his total cost of doing business. At the same time, the telephone rates for the Browns and their neighbors would go 'way up. Some of them might have to give up service or change to a busy four-party line. Rates based on costs would obviously be bad for them. But they would be bad for Joe too, because he would miss much of the business they used to telephone in. Joe would much rather pay his present rate and keep his telephone busy with incoming orders.

Weighing the Various Objectives

PERHAPS this brief discussion of the various objectives of telephone rates leaves you with the impression that sometimes they pull in different directions. Indeed, sometimes they do. The best quality service is usually not the least costly. Rate treatment designed to encourage maximum use as to number and duration of calls and extent of area covered, if carried to too great lengths, might require rate levels which would not permit the maximum number of customers to have service. To cite an extreme—we obviously couldn't offer nationwide flat-rate service.

There is no magic formula for resolving these cross-purposes. The rate engineer studies past experience with various service offerings and rate relationships in his own and other territories. On the basis of this experience he weighs the pros and cons and attempts to arrive at the schedule which, in his judgment, will be most satisfactory from all standpoints.

The answer isn't the same at different times or in different areas. Different circumstances and conditions, and customers' habits and preferences, all have to be taken into account. By way of illustration, when both flat and message rates are offered, in some areas almost no one takes message-rate service while in other areas there is a fair amount of measured service. Similarly, many residence customers, in some areas, seem fairly well satisfied with party-line service while in other areas relatively few consider this service adequate. These and many other differences in customer attitudes are taken

into account in designing the different rate schedules.

Another important factor is the relative levels of revenue requirements in different states. Since intrastate service in each state and interstate toll service are subject to different regulatory authorities, each must stand on its own feet financially. Differences in revenue requirements may affect rate structures as well as rate levels. For example, in one state, individual line and two-party flat rates may be low enough to promote a large residence development. In another state, where rate levels are necessarily higher, four-party flat rate or two-party message rate service may be added at lower rates to attract low-income customers. An independent company operating two or three small exchanges must view its rural rates as its major source of revenue, while to a company operating in large cities this would be less significant. These differences must be duly recognized in the rate schedules in order that each company may meet its revenue requirements in each state.

THE major objectives of rate making are always the same: "The most service and the best at the least cost to the public consistent with financial safety." Since conditions may differ widely, rate engineers strive not for uniformity of rate schedules but to develop the best possible solution to the rate problems of each area, so that all may accomplish the basic objectives to the greatest possible extent.

Merry Christmas!

In recent years, the evening cheap rate for trunk calls has been suspended throughout the United Kingdom on three days at Christmas and on New Year's Day, with the object of freeing from duty on those days some of the evening operating staff.

For the past two years, however, in order that staff relief could be given on the days most appropriate to the staffs north and south of the Border, the suspension was: Scotland—25th and 31st December and 1st and 2nd January; Rest of U.K.—24th, 25th and 26th December and 1st January.

This arrangement has proved to be more satisfactory. On these evenings, traffic levels were 25 to 40 percent below those of a normal evening and, in general, each member of the operating staff was free on at least one of the holidays.

From *Telecommunications* of the United Kingdom Post Office

Despite Specialized Equipment and Modern Methods, It Is The Man on Foot or on Snow Shoes Who Closes the Gap And Maintains Service Where the Snow Lies Deep

Operating in the Hazards Of Deep Snow

Stuart Shaw

Winter comes to all the Bell System's Associated Companies, but some get more than others. The one which gets the most, and encounters the most spectacular problems, is probably The Mountain States Telephone and Telegraph Company, whose territory extends from the Canadian border to the Mexican, and embraces the Rocky Mountains. So for our Winter issue we solicited from that Company the following description, in words and pictures, of what it is like to carry on in the high, cold, snowy country which it serves. EDITOR.

SNOW had started falling early last winter on Elwood Pass, nearly 12,000 feet above sea level in the rugged mountains of south-central Colorado, and by Christmas of 1951 it had reached an actual measured depth of 12 feet on the level—only there wasn't any level. It was all up and down, and violent winds had created mountainous drifts.

The Denver-Durango toll line of The Mountain States Telephone and Telegraph Company, that connects Durango, Colo., with larger centers on the eastern slope of the Rocky Mountains, had gone out of service late in December. Of course there were other ways to get in to Durango telephonically: down from Grand Junction on the north or up from Albuquerque, N. M., on the south. In addition to through carrier circuits that were quickly rerouted over a round-about path, this line carried two physical circuits and one phantom circuit, and the loss of these facilities would be felt—what with toll usage on the up grade.

The trouble lay in a 17-mile section of line between Pagosa Springs and Alamosa that follows an old wagon road over Elwood Pass. The

This is Elwood Pass a mile East of the top. The telephone pole line, extending from the bottom center of the picture to the upper right, passes the Elwood shelter cabin in a clump of trees at the left just before the line enters the heavy timber

modern automobile highway, constructed since the telephone line was built, follows a different route in this section. The result was that for years the winter maintenance on this section of line had to be carried out by men on snowshoes. Relief cabins stocked with provisions were located on the route, because going in there in winter involved a trip of several days fraught with danger from snowslides, extreme weather, and exhaustion.

These hardships are not new to Mountain States men, for they have faced them over the years in many crossings of the main range of the Rockies. They were first faced 'way back in the '80s when a line was built over Mosquito Pass to reach the booming mining camp of Leadville and connect it with Denver. They occurred again on Imogene Pass, between the mining towns of Ouray and Telluride, Colo.—but that line was rolled up and abandoned a number of

This is Elwood Pass as it starts down the West side of the mountains. Here too keen eyes will find the pole line running from the bottom center of the picture diagonally to the right to disappear among the trees in the background

years ago in favor of easier available routes.

And they were present on inaccessible Argentine Pass, at 13,000 feet above sea level, where the line was even buried underground to keep it in place—only to have the mountain rats eat off the insulation so it had to be brought above ground again and heavy conductors placed on heavily guyed poles to resist the arctic conditions. The Argentine Pass line was replaced in 1940 by one over Loveland Pass at 12,000 feet that follows the main automobile highway between Denver and Grand Junction and is never far from the road. As a matter of fact, this latter line gives little trouble because of its heavy construction, although occasionally a snowslide comes down and simply moves off with a whole section of it, poles and all.

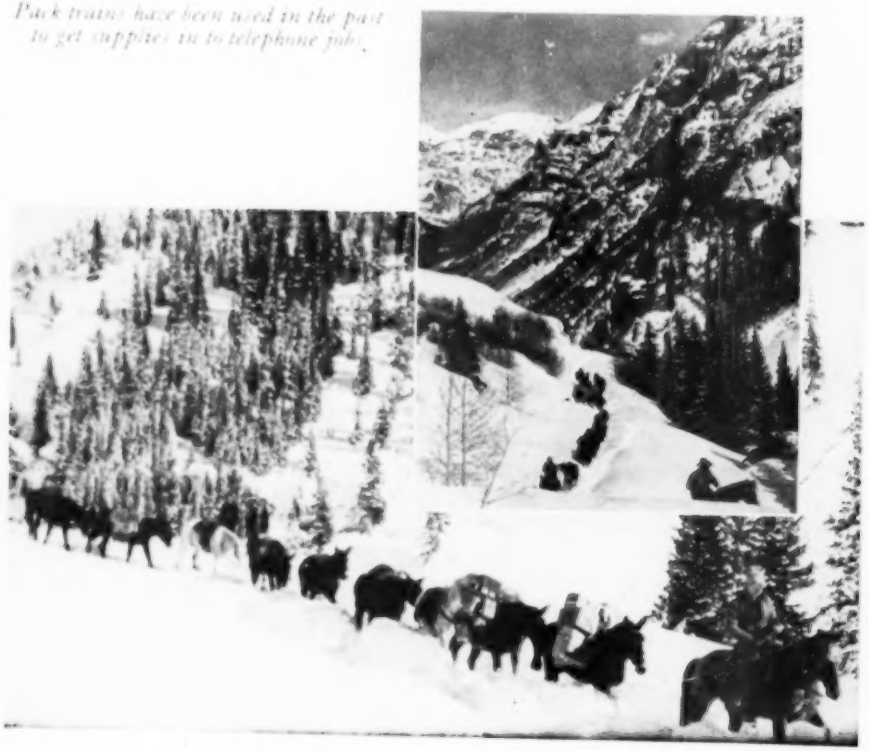
It is only natural to wonder why, over the years, telephone lines have been built in such difficult places,

where men have to go afoot to repair them. It is because in the early days they were built to reach the mining camps and the mining camps were where the ore was. Wagon roads were built between these camps, and the telephone lines quite naturally followed these routes. Then along came the horseless carriage, and better roads were developed over more favorable routes during a period of a good many years, and the telephone lines were frequently left on abandoned roads that became little better than foot trails in some sections. Rebuilding those lines over new routes has been carried on gradually, but it is an expensive business.

IN SPITE of every effort on the part of telephone crews operating from Alamosa on the east and Durango on the west, winter ruled supreme on Elwood Pass. Using the experience and the equipment that have proved effective in other years, local repair forces and construction crews were still unable to penetrate the mountainous drifts and dangerous slide areas that locked this section from the outside world. It took 58 days to get that toll line back in service.

Photographs taken from the air indicated that in places the line was completely buried in the snow and that in numerous instances large trees had been carried down by the weight

Pack trains have been used in the past to get supplies in to telephone jobs



Dog teams have served a need also—as here on Cottonwood Pass

of snow and the wind and had fallen through the line, breaking or short-circuiting the wires.

Even the Company's Sno-Cat, a 4,000 pound juggernaut with four powered pontoons and cleated tracks, couldn't penetrate the winter wonderland west of Alamosa.

Built especially for winter toll line patrols, and so powerful that it can pull itself out of almost any difficulty encountered on the trail, the Sno-Cat had mastered the snow conditions of other years. Even in this case it might have rammed its way through some of the deep drifts created by 12 feet of snow driven by 60 mile-an-hour winds. But the end wouldn't justify risking the lives of men. The crew would be in great danger at many points from snowslides that would start at a whisper, as well as from the chance of upsetting the vehicle on the heavily drifted shelf roads skirting perilous cliffs.

The 'Cat is able to carry four men in an aluminum cab which is completely inclosed to shield them from the weather. It contains a heater and sleeping bags, air mattresses and food supplies for emergency. When needed, a ski-equipped trailer capable of carrying over a ton of supplies can be towed behind.

But the 'Cat was unable to travel on the steeply inclined snow where it had drifted in on ledge roads. Some thought was given to bringing dog teams up from Aspen, but the danger would still be there, as slides were running constantly. Supervisory people decided that the risk of sending men in there was too great.

It was a good, real-life illustration of our well-known statement of principle that "No job is so important

The Sno-Cat is today's answer to the challenge of the steep and snowy slopes and passes

and no service is so urgent that we cannot take time to perform our work safely."

When snowslide conditions became somewhat less hazardous, bulldozers were called in and set to work from both ends of the closed section, clearing out the road. It was slow business, and dangerous too. Slides were still a threat, and with almost continuous snow storms, roads drifted in behind the bulldozers.

Finally, after 58 days of work and wait, of advance and retreat, the crews reached opposite sides of the three-mile section covered by McCormack Slide. Oh yes, these slides "run" in the same places every year and have names—nicknames, even—and there is much spirited wagering on when this one or that one will "run," that is, come thundering down a mountain carrying everything before it, snapping off trees like matchsticks. McCormack Slide is always too dangerous to be covered in any way but afoot and *carefully*. That was done in this case.

And so on February 18, 1952, the last splice was finally made and the precious thread of communication was restored.

A sample of the conditions encountered is revealed in the log of one of the crews that related laconically under date of February 8, 1952:

"Took 14 trees out of line and cleared 137 wire breaks yesterday and today."

You ask, "Is it worth it, just to enable people to talk to one another?" Well, telephone men have thought so for quite a few years now, and will probably go right on thinking so.

But it is not too surprising to learn that the death sentence has been passed on part of this line. The through service will be provided by a modern carrier system over a more circuitous route.

At the time the line over Elwood Pass was restored, actual snowfall in the area had been measured at 500 inches, or *more than 41 feet*! Of course it had packed down, but that was the cumulative total measured after each fall.

Such figures and descriptions may give an entirely false idea of winters in the Mountain States area. Although arctic conditions are the rule at 10,000 feet or above, residents of Denver and other plains cities about 5,000 feet didn't shovel their side-

But to reach the wires, in many places, the weary miles still must be covered afoot

The Winter snow piles deep

walks more than two or three times last winter, and on a few occasions whisked off light snow with a broom.

IN THE SAME PERIOD of the Elwood Pass difficulty, a telephone crew was out for several days when service failed on Cumbres Pass, between Antonito, Colo., and Chama, N. M. Out of 25 miles of line, five miles were completely buried and out of sight under the snow.

Overtaken by a severe blizzard through which they could not proceed, this crew was compelled to spend the night in the Sno-Cat, where they made good use of the emergency rations and sleeping bags carried for just such a purpose. Telephone people at Alamosa became alarmed at failure of the crew to report in by telephone, and sent out an airplane the next day which located them and determined that they were not in need of help.

During the time this line was out of service a radio channel was utilized to connect the facilities of the independent company at Chama to the general telephone network at Sante Fe. The radio link has proved a useful addition to the facilities available to Chama, and plans are under way to continue radio operation in the Sante Fe—Chama section.

On another occasion last winter a dog team of Alaskan Huskies was chartered and used successfully to transport men and supplies to repair line breaks on Cottonwood Pass in central Colorado.

No doubt the most difficult crossings of the mountains are to be found in Colorado because they are the highest, but severe weather conditions occur in other states of the Mountain territory, notably Utah, Wyoming, and Montana, with a little of it in Idaho, too.

Blizzards on the Wyoming plains can be sudden and treacherous, but the greatest snow difficulty is encountered over in the Jackson's Hole country, a famous dude ranch and hunting area. Every winter some trouble occurs on Two-Gwo-Tee Pass between Lander and Jackson. A Snoplane is used in this area for transportation over the heavily drifted snow. It is a cab on skis that is driven by a motor and airplane propeller. It carries two men.

A motor driven toboggan with cleated track has been used with some success in Idaho.

The reason for different mobile equipment in different areas is that snow conditions vary by localities.

Surprisingly enough, the telephone

maintenance people in Montana will tell you that it is not a "snow country." Sure, the temperatures are low now and then, they say, and snow may drift over the roads, particularly in eastern Montana. The Sno-Cat that was stationed at Helena last winter was used only once, and that was in rescue operations after an airplane crash high in the mountains. This winter the Montana people planned to station the 'Cat in eastern Montana, probably at Glasgow, where it would be of more use when roads drifted in and were blocked to automobile travel.

A wide right-of-way has been cut through trees on the Helena–Salt Lake City toll line so that it is relatively trouble-free.

Some trouble is encountered on the line between Logan, Utah, and Montpelier, Idaho, of some forty miles over the mountains. In the past it

Above: The McCormack snow slide area from the air. Right: An extraordinary photograph, made some years ago, of a snow slide descending on a four-horse team and three telephone men. It was a small slide, and there were no casualties

In the end, it is men on foot or on snowshoes who actually join the broken threads of communication

was cleared by men on snow shoes, but for the last two years a motorized unit called the Sno-Shu has been helpful.

Greatest winter maintenance trouble in Utah occurs between Provo and Price on the Denver–Grand Junction–Salt Lake toll line. The line ranges up to ten miles from U. S. Highway 50, reaching an elevation of 10,185 feet at Mapleton Canyon. It continues down to an elevation of 7,477 feet at Soldiers Summit and on into Price. From January to June of 1952 there were 14 total failures in this section. In some instances 25 and 30 foot poles were ten feet under the snow, with resultant broken poles, crossarms and wires. Restorations were made with twisted pair and spiral-four cable. In many places on this line the terrain is so steep that only men on snow shoes can reach the line, and transportation of material is a problem.

Despite this emphasis on the spectacular, we are gradually getting rid of our most difficult winter maintenance problems, either by rerouting lines so they are more accessible from highways or by utilizing results of the latest research in carrier systems, which permit their use over circuitous routes.

Yet even with the help of motorized equipment and modern methods, in the final analysis it is, as it always has been, the man on foot or on snow shoes who actually closes the break and restores the flow of communication so that other men and women may go on talking with each other across the length and breadth of the land.

Advance Planning for Retirement

Laurence N. Roberts

Mr. Roberts was employment activities supervisor of The Pacific Telephone and Telegraph Company at the time of his retirement on June 30, 1951. He had long been active in the work of the Telephone Pioneers of America, and was a vice president of the Telephone Pioneers Association. The following paragraphs are quoted from The Telephone Pioneer, *quarterly publication of that organization.* EDITOR

RETIREMENT!—what a word! To some, it appears to mean the end of everything; the end of their life's work, with nothing further remaining to achieve. To others, "retirement" is a technical word, applied to the completion of one phase of their careers. It is not the end of life; not a time to fold the hands and wait.

Our real endeavor at retirement should be to continue to try to bring into fruition the purpose in life we have been striving all along to accomplish. Our problem now, as Dr. Harry Benjamin reminds us, is "not to add years to our life, but to add life to our years."

So much for what retirement means. Now comes the question: What steps can we take to prepare for it? What are the basic things we should consider in making our plans?

1. Start planning early.
2. Enjoy living.
3. Keep your plans within your physical ability.
4. Make your plans fit your income.
5. Have a hobby.
6. Have an objective.
7. Stay where your roots are down.

Start Planning Early

IN A MEASURE, in entering upon our new career we face the same problems we faced when we embarked upon our first. If we were not prepared, if we had not adjusted ourselves to life, we had a long, hard struggle to make up for our deficiencies. The adjustment to our new career will be easy or hard, short or long, depending upon the same factors.

Intelligent planning in advance will not only prepare us for the change, but will help us to know what we are going to do and how we expect to accomplish it. It will help us to bring our plans into balance with our expected income and provide an incentive for saving money. It makes no difference if we change our plans a hundred times before we actually retire. The planning will have been fun. It will have helped

This retired telephone man's talent not only satisfies a creative urge for him, but helps others to an objective viewpoint before they are ready to retire

us to adjust our point of view, enabling us to look forward to our new status with keen anticipation rather than dread.

Enjoy Living

If you haven't enjoyed life and living before retirement, the act of retirement will not give you this enjoyment. It has been truly said that this world is not a happiness factory. One who is content merely to stay alive and sees no point in trying to do anything with his life, either to make it better or to make his surroundings a better, happier place, will be deprived of much joy and satisfaction. He will always be piling bricks, never building a cathedral. But the man or woman who lives to be able to say at the end of life, "I have fought the good fight and run a good race" will find the way to happiness.

It is not given to many to shout from the mountain tops. Most of us must live in the valley. Our deeds go unsung and unheralded, but those minor satisfactions which make for the enjoyment of living are not dependent upon the plaudits of the crowd, but upon the knowledge of a life well lived before God and man.

If you desire happiness, don't seek it for yourself but give it to others. You can't pull yourself up by your boot straps. You can have friends, and all they mean, only when you forget about yourself and become a friend to others. This is not so much doing things as it is a point of view. It is the spirit which is exemplified on the three sides of the Pioneer emblem, and can be felt as a tangible thing at Pioneer gatherings, and especially at General Assembly meetings.

Keep Your Plans Within Your Physical Ability

Many people make the mistake of assuming that at 60 or 65 they will have the same energy they had at 50 or 55. They forget that at 60 or 65 they will be on the down grade as regards physical endurance. I know a retired man who at 50 decided he wanted twenty acres to farm when he retired. At 55 he reduced it to ten acres, and at 60 he came down to five. At retirement age, 65, he rented a house on a large lot and finds that it gives him all he can take care of.

My own experience is a case in point. My wife and I, at 55, held a typical telephone conference to decide what our fundamental plan for retirement should be. We wanted to travel, I wanted physical exercise for health and happiness. We wanted to be near our friends, and live in a good all-year-'round climate.

We finally settled on a place appropriately called Paradise, 175 miles from our home base at San Francisco. The elevation is about 1800 feet, which is out of the extreme heat and below the normal snow line. Between ten and fifteen thousand people, many of whom are retired, live on this heavily wooded ridge of Paradise. Everything grows, especially the weeds and poison oak, and there is plenty of cheap water.

You would think that we, of all people, who had spent years counseling with retired and about-to-retire people, would have been sensible in acquiring a place. But no—what did we do? We went hog wild and bought two acres, thickly covered with 8-foot manzanita brush. We lost sight of everything in visualizing that land converted into our dream home.

Our plan is working out, but we would have had fewer problems mentally, physically, and financially if we had given more serious consideration to our physical limitations. If one is to build a retirement home, it is best to complete the home before retirement and thus avoid getting in beyond one's depth, unless, of course, there is plenty of money!

Make Your Plans Fit Your Income

REGARDLESS of how well you plan, it will probably cost you more to live after retirement than you think. It is like planning a vacation. You estimate very carefully what it will cost, then add 50 per cent, and if you are lucky you don't have to wire home for more money. Most of us in our plan for retirement figure pretty close on the money we will have

Pioneers of both sexes and various ages are shown completing a course in furniture upholstery which was sponsored by a Pioneer Chapter

available, giving consideration to living cost (and who can estimate that correctly today?), medical and hospital insurance, trips, etc., but we don't leave much margin for emergencies.

We are then faced with two alternatives, either cutting out some of the things we planned to do, or supplementing our income.

There is another angle to making your plans fit your income. Do your plans permit you to continue your present standard of living? Throughout our working lives we have gradually raised our standard of living in accordance with increased earnings. At retirement most of us face a reduced income.

This problem presents probably the greatest single difficulty during the adjustment period. It is very easy to raise our standard of living but very difficult to reduce it and stay happy.

Too often in our planning we deduct all the things we won't need to do after retirement, forgetting how much a part of our lives some of those things have become. Serious thought as to how you can most nearly continue your present standard of living will go a long way toward easing the adjustment period. Just to get the feel of things, some people try the plan of living, during their last year of employment, on the same amount of money they expect to have available after retirement.

Have a Hobby

HOBBIES are important. Pioneers for years, through counseling, hobby shows, and hobby clubs, have emphasized the desirability of every Pioneer's having one or more hobbies at retirement. Sometimes, however, the implication is that if you have a hobby all your troubles are at an end. It just isn't so. However, when hobbies are fitted into a balanced program of living, they are extremely important in helping to maintain a continuing interest in life: they satisfy that creative urge which seems to increase as people get older.

Hobbies are important for another reason. They add interest and zest to life and help us to have an objective point of view before we retire. All of us have latent talents not utilized on our job, and if through laziness or other causes our sole interest in life is our job, these latent talents are apt to shrivel and die. Then, when we feel the need of other interests at retirement, we have a hard time finding anything we can or want to do. It is not important that the same hobbies, selected early in life, be continued, but if one has formed the habit of utilizing latent talents it is no problem to change to other, perhaps more suitable, hobbies at retirement.

Have an Objective

PLAN TOWARDS SOMETHING. Is it a house in the country, a farm, another job, travel, fishing, hunting, gardening, that you will want after retirement? Whatever it is, start pointing that way some years beforehand. We purchased our place five years before retirement; had a garage with a living room built for week-end use; planted a family fruit and nut orchard; planned the gardens and started drawing plans for the house. Needless to say, we changed the plans

every few months, but when we retired we were pretty well set.

We had a lot of fun developing the place and making plans and if at retirement health or other causes had made us abandon them, it would still have been well worth while. We would have had no trouble shifting to something else. Our plan is probably more than we should have undertaken, but it is better to be too ambitious than to drift along without knowing where you are going.

Stay Where Your Roots Are Down

THIS IS a general rule. Many people have found happiness by moving away from their home surroundings, but they are the exceptions which prove the rule. Surveys of the retirement situation seem to show quite conclusively that for the most part those who stay where their roots are down have the happiest, best balanced life.

The desire to go and live where the sun always shines causes many people to overlook the values they are giving up. New friends and new activities never replace the old, familiar associations. You never realize how lonely you can be with strangers all around you until you have moved away from your old surroundings.

Each Must Decide

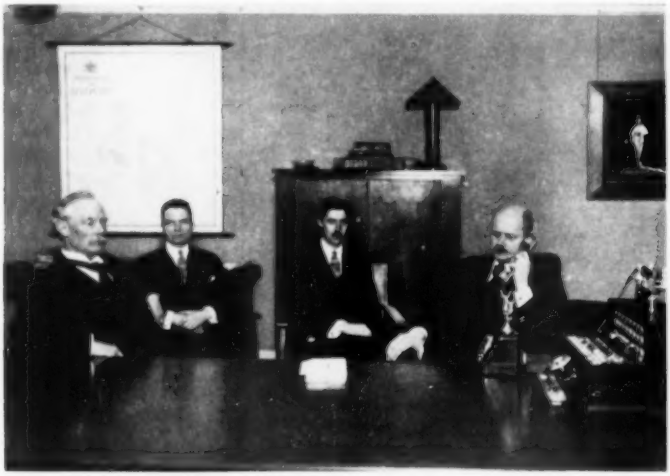
I SHOULD like to say that in writing this article it has not been my intention to try to suggest a panacea for all individual retirement problems. Individuals and their needs are different; each must decide for himself what he seeks in life and how he can best attain it.

Here's happy retirement planning to you!

25 Years Ago

Formal opening of service to another country was a momentous occasion. A. T. & T. President Walter S. Gifford, in the presence of many company officials, greets the French Minister of Commerce and Industry in Paris on March 28

On the European side: On January 20 the Netherlands Minister of Foreign Affairs (right) carried on his end of the initial overseas conversation in Amsterdam, in the presence of the Director-General of the Service (left) and two representatives of the American Legation



Overseas telephone service had been successfully established on a commercial basis in 1927, and its extension to foreign countries proceeded rapidly in the years thereafter, until today more than 96 per cent of the world's telephones

One of the pleasant consequences of the establishment of service with France was that, a couple of years later, a picture syndicate was able to import this photo of Mmes. Costes and Bellonte, in Paris, talking with their aviator husbands in New York after their successful trans-Atlantic flight

Overseas switchboards at The Hague (center) and Berlin (bottom) looked not very different from ours 25 years ago

are within voice reach of this country. In the first quarter of 1928—twenty-five years ago—service was established between the United States and Belgium, The Netherlands, Germany, Sweden, and France

Mrs. Helene C. Bateman

Stuart Shaw

Who's Who & What's What

(*Continued from page 199*)

MRS. HELENE C. BATEMAN became a member of the original Rate Section at A. T. & T. in 1917, and since 1945 she has been head of the Exchange Rate Group. The men and women whose activities she directs assist the Associated Companies in matters concerning their exchange rate schedules, service offerings, and rate treatment for metropolitan areas. She has probably helped more people, both at Headquarters and in the field, in better understanding the theory and practice of rate making than any other one person in the System. She is the principal author of "Notes on Fundamental Principles Underlying Rates for Exchange Telephone Service"—the "Orange Book"—of which over 2000 copies have been distributed among the Associated Companies. Many of those fundamental principles are reflected in her contribution to this issue.

SEVERAL YEARS of newspaper experience in Denver preceded STUART SHAW'S employment in the Public Relations Department of the Mountain States Telephone and Telegraph Company in 1928. Two years later he was appointed editor of the *Monitor*, the Company's monthly publication, which post he left in November 1952—22 years later—to become assistant personnel director in the Personnel Relations Department. During his period as editor he traveled widely in the Company's border-to-border territory, and he also gained much recognition for the professional quality of his amateur photography. To this MAGAZINE for February 1942 Mr. Shaw contributed "Across the Roof of the Continent," an article describing the construction of a new telephone line over Loveland Pass at a height of 12,000 feet, in the Rockies.

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